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ABSTRACT

This report consists of chapter 8 (the chapter on nursing) and relevant other sections of the "Seventh Report to the President and Congress on the Status of Health Personnel in the United States, March 1990." It presents and analyzes recent developments in the education, supply, and distribution of nursing personnel; and provides an assessment of the future supply of and requirements for nursing personnel through the year 2020. An executive summary of the full health personnel report is included. In the reprint of chapter 8 from the full report, s section on current developments in nursing education addresses issues in basic nursing education to prepare for registered nurse (RN) licensure, post-RN academic nursing education, costs of educating nursing students, and programs preparing practical nurses. A discussion of current developments in the registered nurse population examines the registered nurse supply, nurse immigrants, geographic distribution of registered nurses, and distribution of nursing personnel within the health care system. Two final sections discuss, respectively, rates of compensation and the outlook for the future. Other relevant sections of the full report that are reprinted here include the introduction, an overview of major personnel developments for all health personnel, and current and emerging health personnel issues. Includes a total of 34 references. (JDD)

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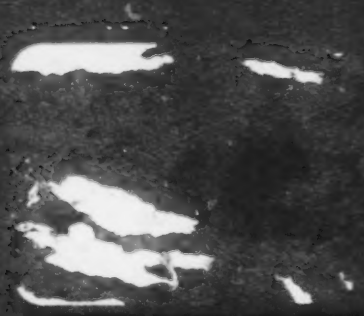
NURSING

SEVENTH REPORT TO THE PRESIDENT & CONGRESS

ON THE STATUS OF HEALTH PERSONNEL

IN THE UNITED STATES



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NURSING

SEVENTH REPORT TO THE PRESIDENT AND CONGRESS

ON THE STATUS OF HEALTH PERSONNEL

IN THE UNITED STATES

March 1990

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Health Resources and Services Administration
Bureau of Health Professions

FOREWORD

This report on Nursing is excerpted from the Seventh Report to the President and Congress on the status of Health Personnel in the United States, March 1990. The Seventh Report is a continuation of a series of reports on health personnel assembled by the Secretary of Health and Human Services and submitted to the President and the Congress in response to the directive of several different sections of the Public Health Service Act. An executive summary of the full report is included in this document.

The nursing report, which consists of Chapter VIII and relevant other sections of the Seventh Report, presents and analyzes recent developments in the education, supply, and distribution of the Nation's nursing personnel. It also provides an assessment of the future supply of and requirements for nursing personnel through the year 2020.

Ordering information on the full Seventh Report may be obtained by contacting Mr. Howard V. Stambler, Director, Office of Data Analysis and Management, Bureau of Health Professions, Parklawn Building, 5600 Fishers Lane, Room 8-47, Rockville, Maryland, 20857. Questions regarding the material included in the nursing report may be directed to the Division of Nursing, Room 5C-26 at that same address.

We are pleased to make this report available to you and hope you find it useful.

EXECUTIVE SUMMARY

The Seventh Report to the President and Congress on the Status of Health Personnel in the United States submitted by the Secretary of the Department of Health and Human Services responds to the directives of several legislative authorities. The report presents information on personnel in the health professions of medicine (allopathic and osteopathic), dentistry, nursing, public health, allied health, clinical psychology, optometry, pharmacy, podiatric medicine, veterinary medicine, chiropractic, and physician assistants. In addition, the Seventh Report contains a discussion of current and emerging health issues and problems that influence the demand for health personnel, their geographic distribution, and their educational preparation. The Report also contains a discussion of significant cross-cutting health professions issues, such as the underrepresentation of minorities within most health professions educational programs. This underrepresentation affects the racial/ethnic composition of health care providers and, in turn, may adversely affect minority access to health care.

The major findings and conclusions of the Seventh Report are summarized here in three sections: current and emerging health issues; health personnel supply, requirements, and education; and current and emerging health personnel issues and concerns. The full report deals in depth with each of these issues and developments.

Current and Emerging Health Issues

Although many aspects of the health of the United States population have improved in recent years--for example, heart disease mortality in persons 45-64 years of age and stroke mortality among those in the 55-74 age group have declined substantially since 1970--a number of emerging health problems have increased the demand for services provided by health personnel.

- *The American population is aging dramatically. By the year 2030 there will be 64 million people 65 years of age and older, more than twice as many as there are now. Moreover, between 8.7 and 12 million elderly will be in the oldest age group, 85 years and over, in 2030. Elderly living alone are projected to number at least 30 million in 2030, compared to 12 million in 1990. Those with some disability will total 16.3 million in 2030, up from 6.2 million in 1990. Large increases in the demand for health services are expected, not only for care of the sick, but for health promotion and illness prevention services that help reduce the burden of illness and disability of the Nation's aging population.*

- *Infant mortality continues to be a pressing problem. About 38,000 infant deaths occurred in 1988. Even though the infant mortality rate has declined steadily over the past 50 years, the United States ranks 22nd among Nations in infant mortality. The infant mortality rate for Blacks--18 deaths per 1,000 live births--is twice that for Whites. The role of health personnel in reducing infant mortality through pre- and post-natal care is well understood. Provision of needed care can contribute to the reduction of the risk of premature, low-birthweight infants, resulting in healthier babies.*

- *Over 100,000 cases of, and over 59,000 deaths from acquired immune deficiency syndrome (AIDS) were reported to the Centers for Disease Control (CDC) between 1981 and July 1989. In addition, an estimated 1 to 1.5 million persons in the United States are infected with human immune deficiency virus (HIV). AIDS patients require considerable amounts of care from physicians, dentists, pharmacists, nurses, mental health personnel, and many types of allied health personnel. The large number of HIV-infected persons has a major impact on the Nation's health care system and on health personnel since studies indicate that within 10 years more than half of those infected will develop AIDS. The burden of coping with AIDS has created a public health crisis that can only be solved by joint efforts of Federal, State, and local governments, health practitioners, health professions associations and the public at large.*

- *Substance abuse, the abuse of alcohol and drugs, has become a major public health problem in the United States. During the 12 month period ending October 30, 1987, 2.3 million people had been treated for substance abuse, placing a heavy burden on the Nation's health care, mental health, and social services. Substance abuse also adversely affects other health and social situations. Over 50 percent of traffic accidents, including many fatal ones, are related to substance abuse. Pregnant women who are drug abusers are at high risk of having premature, low birthweight and sickly babies, many of whom die during the first year of life. Shared needles by abusers are a major source of the transmission of AIDS. As addiction to alcohol and drugs is now recognized as a chronic and treatable disease, health professionals, including mental health personnel, are increasingly needed to provide services for the prevention, diagnosis, and treatment of this very serious and pervasive health and social problem and its consequences.*

- *Profound changes in the health care delivery system are affecting health personnel supply, demand, and distribution. In response to the continuing escalation of expenditures on health care, now over one-half trillion dollars and over 11 percent of the gross national product, many attempts are being made to contain health care costs. Prominent among these is the prospective payment system for patients insured under Medicare, which has reduced the average length of stay in hospitals,*

but also resulted in a higher acuity level among patients, on average, in short stay hospitals. One consequence has been an increase in the nursing intensity and workload, raising the demand for nursing personnel and the expression of concern about nursing shortages. Shorter lengths of stay have increased the utilization of long-term and home health care and the demand for health personnel to provide those services.

Emphasis on cost-containment also has led to greater usage of ambulatory services. In another development, the health care system has been moving towards "corporatization" through amalgamation of health care entities into larger multi-agency "systems" and increased competitiveness through a variety of choices in health insurance and the ways in which health services are delivered and by whom, such as the growth of prepaid and capitated insurance programs.

Desire to moderate increases in health care expenditures without adversely affecting quality of services, increasing interest in developing appropriate and effective procedures and treatments, public demand for identification of practitioners who provide substandard medical care, and concern about costs of medical malpractice have also contributed to an intensified focus on the quality-costs parameters of the health delivery system.

Demand for more aggressive identification and tracking of practitioners who provide substandard care resulted in enactment of the Health Care Quality Improvement Act of 1986 (Title IV, Public Law 99-660). A prominent part of this legislation is establishment of a National Practitioner Data Bank (the Bank). The Bank will receive and release information on: (1) payments made for the benefit of physicians, dentists, and other health care practitioners as a result of medical malpractice actions or claims; (2) licensure disciplinary actions taken by State medical and dental boards; (3) professional review actions taken by health care entities, such as hospitals or health maintenance organizations, which adversely affect the clinical privileges of a physician or dentist for more than 30 days if the actions are based on peer review of the practitioner's professional competence or conduct; and (4) adverse actions taken by professional societies on membership of physicians and dentists. In addition, the Medicare and Medicaid Patient and Program Protection Act of 1987 (section 5, P.L. 100-93) expands the Bank's information base to include adverse licensure actions involving all licensed health practitioners and health care entities. The Department is also markedly expanding its science-based research program intended to improve the quality of health care. This effort should reduce health care costs by eliminating unnecessary and

inappropriate health care services. Major components to the Department's medical treatment effectiveness are significant expansion of research on patient outcomes and clinical effectiveness; expanded collection, development, and analysis of clinical and claims data; and dissemination of research findings and data analysis.

Research findings will be transferred to practitioners through professional organizations and journal publications, public education, medical school faculties and by integration of findings into medical education.

Health Personnel Supply, Requirements, and Education

- *Following the increases of the 1970s, the number of applicants to health professions schools has declined in most health fields since 1980. The sharpest decline has occurred in dental schools, a 44 percent decrease. The decline in allopathic medical schools was 27 percent during this period. However, although applicants to allopathic medical schools have declined, first-year enrollments rose slightly, from 16,686 in 1987-1988 to 16,785 in 1988-1989. The number of admissions to nursing schools fell from a peak of nearly 124,000 in academic year 1984 to under 91,000 in 1987, but rose again to over 94,000 in 1988.*

- *About 80 percent of all health personnel are women. While this reflects the traditional predominance of women in nursing and in many allied health disciplines, the proportion of women in professions such as medicine, pharmacy, and dentistry, once composed mostly of men, has been increasing sharply. In 1988-1989, the percentage of women enrolled in medical schools reached an all-time high of 35.1 percent. One-third of enrollees in dental schools are women and schools of pharmacy and veterinary medicine have more female than male students. The increase in female enrollees has kept the enrollment decline in many professional schools from being even steeper than it actually has been.*

- *Minority enrollments in a number of health professions, both total and first-year, have not changed significantly in recent years. However, Black enrollments have increased less than those among other minority groups. Although the percentage of Blacks among first-year enrollees in medical schools has risen since 1980 from 6.6 to 7.2, their numbers have not changed significantly. During the same period, the percentage of Asian Americans/Pacific Islanders, rose from 3.3 to 12.4 percent. Numbers of Asian students have increased significantly in many health professions schools.*

- *Along with declines in enrollments, the numbers of graduates from health professions schools have also declined, although not as sharply. Medical school graduates declined from an all-time high of 16,343 in 1985 to 15,646 in 1988-1989. Graduations from basic schools of nursing have declined 8 percent from a high of over 80,000 in 1985. However, the number of graduates from most health professions schools remain higher than in 1970, which was the beginning of a long period of expansion.*

- *The number of active health personnel continued its steady rise since 1970 despite declines in the numbers of new graduates because the number of new entrants to the professions exceeded losses due to deaths, retirements, and other reasons. The supply of registered nurses has more than doubled, from 750,000 in 1970 to over 1.7 million in 1988. Relative increases in other professions, including allied health personnel, while not as great, have outpaced population growth so that ratios of heath personnel to population have continued to increase and are now at their highest levels.*

- *The growth in the supply of many health professions is expected to slow down in the future, particularly during the years 2000 to 2020, due to the attrition among aging and retiring active health personnel and continuing smaller graduating classes. For some groups, such as nursing and dentistry, the projection is that the supply in 2020 will be lower than it is today. Today's shortage of nurses, attributable to a rising demand for nursing services because of higher levels of patient acuity and technological advances, causes concern about projections of a smaller supply of nurses in the future. The emerging health issues and problems, and the major changes occurring in the health care delivery system and in the educational system for health professionals, lead to concern about whether the supply of health personnel will be adequate to meet the Nation's requirements for health care in the future, particularly after the year 2000. Although the aggregate physician supply may be adequate to meet future requirements, it appears likely that shortages may continue to exist in some specialized areas and geographic locations, as well as in nursing, public health, and some allied health fields.*

Current and Emerging Health Personnel Issues and Concerns

- *Contraction of the applicant pool and declines in enrollments and graduations have been occurring in many health professions education programs. Declines have been attributable to changes in age distribution of the population--the number of people 18 to 25 has fallen nearly 10 percent between 1980 and 1987; to the relatively higher earning potential and starting salaries in other fields; and to the increasing costs of higher education and rising levels of indebtedness associated with pursuing health professions education. The substantial growth in the supply of health personnel in the past 20 years has provided a solid foundation to meet future requirements, so that the decline in enrollments and graduations will not adversely affect the supply of health personnel in the short run as new graduates still will exceed attrition. However, the situation may not be as favorable after the year 2000. In addition, the utilization of health services may well increase in the future because of such factors as the Nation's aging population which must be taken into consideration when assessing any future balance between supply and demand.*

- *More primary care practitioners are needed to provide services for patients in their initial contact with the health care system. Expansion of primary care will improve access to care, promote the enhancement of health and prevention of illness, and improve the efficiency and effectiveness of delivery of care. Despite these widely recognized benefits, the trend in medicine has been towards specialization, driven in part by the reimbursement system. Recent developments such as the resource-based relative value scale proposed for paying physicians under Medicare may redress the mismatch between the number of health personnel in primary care and the number required.*

- *Recent studies and surveys have revealed shortages of allied health and public health personnel, in geriatrics and gerontology, and in nursing. In allied health, the demand for physical therapists, medical record technicians, radiologic technologists, and occupational therapists is projected to increase by over 50 percent by the year 2000. In public health, high levels of demand for various occupational specialties in environmental health may exceed current supply. Other public health personnel, such as clinical psychologists, epidemiologists, biostatisticians, and public health nurses, moreover, are in the forefront of addressing major new health problems--AIDS, substance abuse, and infant mortality.*

- *Certain racial/ethnic minority groups are underrepresented among health care personnel. In 1985, Black and Hispanic physicians constituted only 3 percent each of total physician supply, while the Black and Hispanic population was 12 and 7 percent respectively of the total U.S. population. Underrepresentation is due to a variety of factors, including inadequate educational preparation, poor career counseling, high costs of health professions education and lack of institutional commitment. Motivation to increase minority representation derives not only from a need to assure equal access to health professions education to all population groups, but from a need to provide health care to minorities and other disadvantaged populations, which is often met mainly by health professionals who themselves are minorities.*

- *Although some improvements have been made in health status by improved access to health care, large segments of the Nation's population still face formidable barriers to adequate care. These include the 32 million estimated uninsured people and the millions of disadvantaged Americans living in inner cities and in rural areas. Health personnel from all disciplines are a key to the alleviation of access problems. Related solutions include more emphasis on primary care and provision of services through a multidisciplinary approach.*

- *As pressure increases to contain health care expenditures, there will be a corresponding emphasis on payment for cost-effective and efficacious treatment and procedures by adequately trained health personnel. The education of future health care providers will need to expose students to concepts of quality assurance, risk management, and outcome-orientation that should result in more effective and safer clinical practice.*

- *High quality and timely data and solid analytical methodologies to support health profession analyses and projections are needed to enhance the policymaking process. Concerns over data inadequacies and obsolescence have grown in recent years. Some data on personnel supply, provided by professional associations such as the American Medical Association, are excellent. Data for other professions, such as those in allied health and public health are much less current and complete. Because of size and complexity, nurse supply data--gathered periodically on a sample basis--are costly and difficult to obtain. Personnel data related to minority issues also continue to be deficient. New approaches by public and private agencies and organizations are being developed to make more valid estimates of present and future supply and distribution of health personnel.*

Chapter 1

INTRODUCTION

Legislation enacted in the 1970s requires the periodic submission of reports by the Secretary of the Department of Health and Human Services to the President and Congress on the status of health professions personnel supply and distribution, and on the numbers required to provide adequate health care for the Nation.

The seventh in a series of reports required by Section 708(d)(1) of the Public Health Service Act, as amended by P.L. 94-484 and further amended by P.L. 95-623, P.L. 100-607 and P.L. 100-690, this report presents information on personnel in the professions of medicine (allopathic and osteopathic), dentistry, optometry, pharmacy, podiatric medicine, veterinary medicine, and physician assistants. In addition, information on chiropractors is provided for the first time.

This is also seventh in a series of reports to Congress on nursing supply, distribution, and requirements provided in response to Section 951 of P.L. 94-63 as amended by P.L. 95-623, and sixth in a series of reports on public health personnel that have been prepared in response to Section 794(c) of the Public Health Service Act as amended by P.L. 94-484 and P.L. 95-623.

Data on allied health personnel, included in the present report in accordance with the recent reauthorization of health professions legislation, provide a more complete coverage of major health personnel fields. The recent Report to Congress on the Study of the Role of Allied Health Personnel in Health Care Delivery (Institute of Medicine, National Academy of Sciences) pointed out the need for more information on allied health personnel.

In part as a result of health care cost containment efforts and growth in the supply of health personnel in the 1980s, the health care delivery system is undergoing rapid and substantial transformation. This report discusses the current status of health personnel in terms of their numbers and how they affect and are affected by changes in the health care delivery system and other health-related developments. It also provides projections to the year 2020 of future supply in most fields as well as information on future requirements for many categories of health personnel.

This Seventh Report to the President and Congress on the Status of Health Personnel in the United States differs from previous reports. In addition to chapters on specific health disciplines, overview chapters have been included which present brief discussions of current and emerging health and health personnel issues and major developments affecting health disciplines.

The health issues now facing the Nation include a rapidly increasing aging population (by year 2020 the population 65 years and older is expected to rise from 12 to 18 percent of the population), a continuing high infant mortality rate (the United States ranks 17th among 43 industrialized Nations), difficulties of access to medical care (particularly for rural and inner city populations), an AIDS epidemic, and widespread use of illicit drugs and other harmful substances.

The personnel issues discussed in this report are related to many factors including, of course, those health problems that have an impact on the demand for health personnel. One important issue is the nursing shortage which has been a major topic of discussion for several years and was analyzed most recently in the Report of the Secretary's Commission on Nursing. Similarly, recent reports on public health and allied health personnel by the National Academy of Sciences' Institute of Medicine have drawn attention to these major groups of health personnel. Other personnel problems that present serious challenges to our Nation include the declining pool of applicants and enrollees in many health disciplines, the concerns about the requirement for academically and professionally trained persons in geriatrics to effectively serve the increasing aged population, the underrepresentation of minorities in health disciplines, and the growing recognition of the importance to the Nation of primary health care services in general and in rural and inner city locations in particular.

The information presented is based on analyses of the latest available data and on the assessment by the Bureau of Health Professions of developments in the health fields. In addition, chapters on nursing and public health include recommendations on program activities, as required by the legislation.

This report analyzes a number of occupations that have widely differing educational requirements and receive support through different congressional mandates. Also, the analyses use databases and analytical frameworks that are not comparable from one occupation to another. Differences in contents of chapters largely reflect differences in the availability of current data and of studies on issues concerning the disciplines. Databases for medicine, dentistry, and a few other health professions are reasonably current and provide a substantial amount of relevant information for monitoring, analyzing, and planning. In addition, a number of useful research studies are available for these disciplines. By contrast, in the public health and allied health fields it is difficult to determine current and future supply of practitioners. As noted in two recent IOM studies, information on issues affecting these practitioners is sparse.

For some other professions, such as optometry, pharmacy, and podiatric medicine, available databases are outdated and are of limited use in analyzing recent developments. For occupations for which current and comprehensive databases are not available, workshop results, current literature, and discussions with professional associations have been used as sources of information. The chapter on data and methodology issues in this report discusses data and forecasting problems.

Variations in the information presented also reflect essential differences in context and focus of the many disciplines included and in issues and concerns surrounding them. Despite differences in presentation and limitations, this report should be a useful and comprehensive reference document that describes what is currently known about health personnel in the major health fields and what future developments are anticipated.

Chapter II

AN OVERVIEW OF MAJOR PERSONNEL DEVELOPMENTS

This section provides a brief statistical summary of some of the major health personnel findings of this report. More detailed discussion of these and other findings are presented in the chapters dealing with specific disciplines, chapters V to XVI.

Trends in Education and Training

- *The number of applicants to health professions schools has continued to decline in most health fields. The largest drop occurred in dental schools where the number of applicants fell to 5,017 in 1988-89, a 44 percent decline since 1980.*

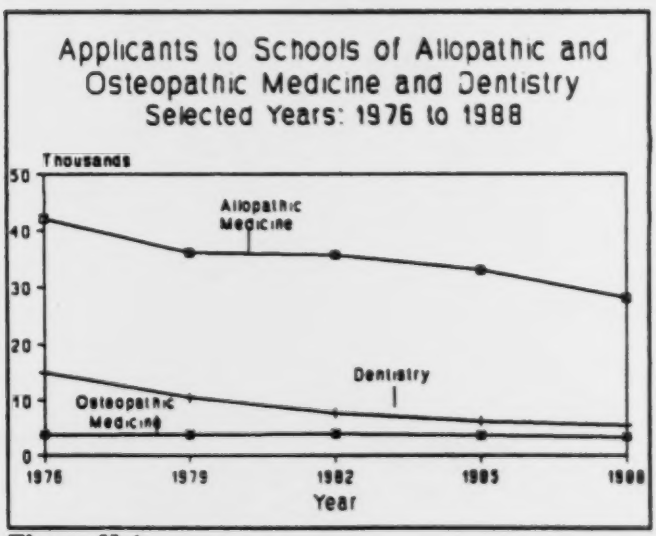

Figure II-1

o *Following major increases of the 1970s, first-year enrollments have also decreased in a large number of disciplines since 1980. Particularly sharp have been the declines in the number of first-year dentistry students, which have dropped steadily since 1981. However, the number of new entrants to medical schools rose about four percent in 1988, the first such increase in 7 years.*

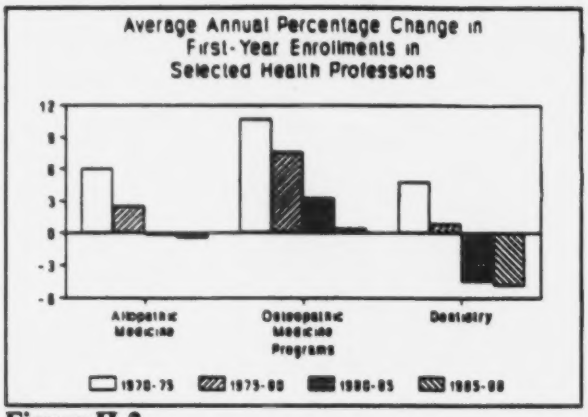

Figure II-2

o *Registered nurse programs have shown declines in first-year admissions and enrollments during the later half of the 1980s. In 1987, however, the number of such admissions grew four percent, possibly signaling a reversal of the downward trend of the past few years.*

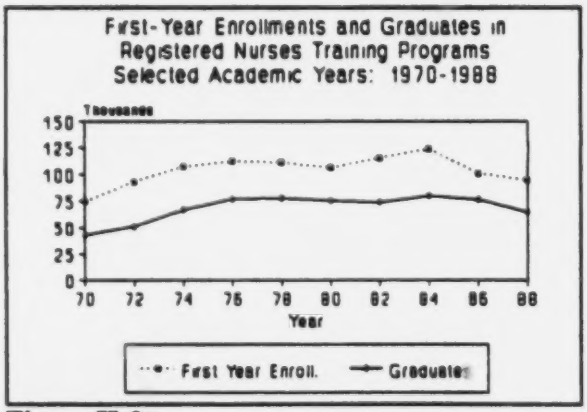

Figure II-3

- *Female enrollments in health professions schools have continued to rise throughout the 1980s, while male enrollments in many disciplines have declined. Women now compose 25 percent or more of the total enrollment in the major health professions. All fields showed significant gains, with schools of pharmacy and veterinary medicine having more female than male students.*

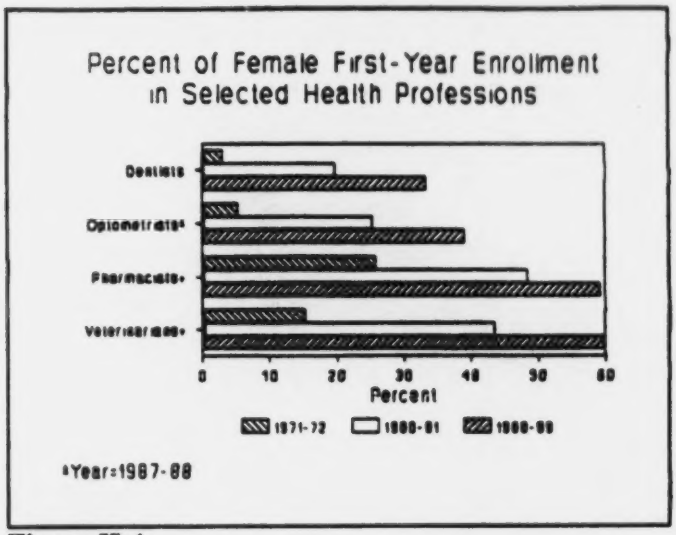

Figure II-4

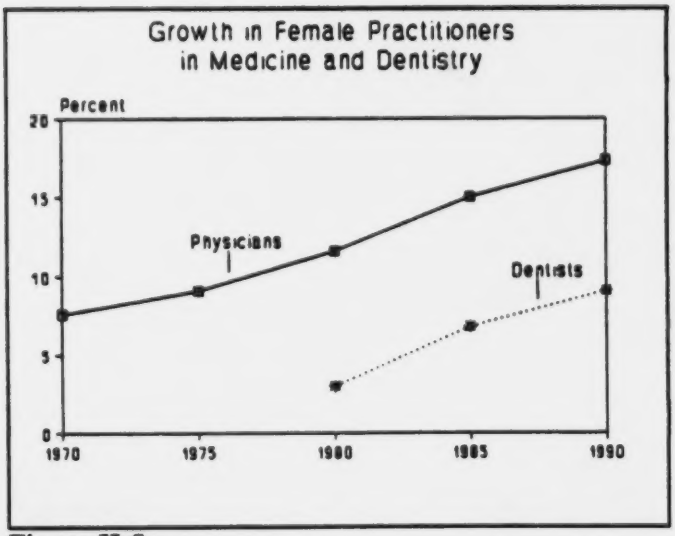

Figure II-5

o *Minority enrollments in selected health professions schools have risen over the past few years and first-year and total enrollments were generally up from the levels of the early 1980s. Black enrollments, however, have increased less than those of other minority groups.*

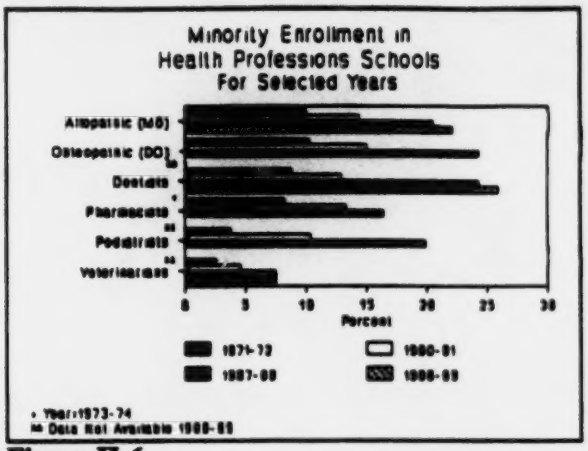

Figure II-6

o *Despite the recent enrollment declines, the numbers of graduates from some health professions--osteopathic physicians, veterinarians, optometrists--have shown small increases as compared to academic year 1980-81. Decreases in graduates have occurred among registered nurses, pharmacists, and dentists.*

Number of Graduates of Selected Health Professions Education Programs

Professions	1970-71	1980-81	1987-88
Total Physicians	9,446	16,818	17,194
(Allopathic Medicine)	8,974	15,667	15,630
(Osteopathic Medicine)	472	1,151	1,564
Registered Nurses	46,455	73,885	65,845
Veterinarians	1,239	1,932	2,169
Pharmacists	4,747	7,323	6,184
Optometrists	528	1,082	1,106
Dentists	3,775	5,350	4,519
Podiatrists	241	597	590

*1986-87 data

Figure II-7

- *The number of active health personnel continued to rise in the late 1980s as the number of new graduates was more than enough to offset attrition among active practitioners. However, the rate of increase in nearly all fields was less than in the 1970s and early 1980s.*

Active Health Personnel
Selected Years: 1970 to 1988
(In 1,000s)

Professions	1970	1975	1980	1988
Physicians (MD & DO)	328	385	458	571
Registered Nurses	758	961	1,273	1,648
Pharmacists	113	122	142	158
Optometrists	18	20	22	25
Dentists	102	112	126	147
Podiatrists	7	7	9	12
Veterinarians	26	31	37	46

Figure II-8

- *Even though increases in the supply of health personnel slowed down in the late 1980s, growth in the number of active health professionals outpaced population growth.*

- *Practitioner/population ratios in the late 1980s were at their highest levels on record.*

Population Ratios of Health Personnel
Selected Years: 1970 to 1988
Number per 100,000 Population

Professions	1970	1975	1980	1988
Total Physicians	155	174	197	233
Registered Nurses	366	449	560	670
Pharmacists	55	56	62	64
Optometrists	9	9	10	11
Dentists	50	52	55	58
Podiatrists	3	3	4	5

Figure II-9

- *Despite increases in total number of active registered nurses, the rise in demand for nurses by hospitals and other health care sectors has led to an overall shortage of registered nurses in recent years.*

- *The supply of allied health personnel increased during the 1980s, but more slowly than during the decade of the 1970s and early 1980s. The allied health occupations that grew most rapidly during the 1980s were: dieticians and dietetic technicians, speech pathologists and audiologists, cytotechnologists, occupational therapists, physical therapists, and medical technologists.*

- *The number and proportion of women in traditionally male health professions continues to increase rapidly.*

- *Minority practitioners remain a relatively small proportion of the work force in most health professions.*

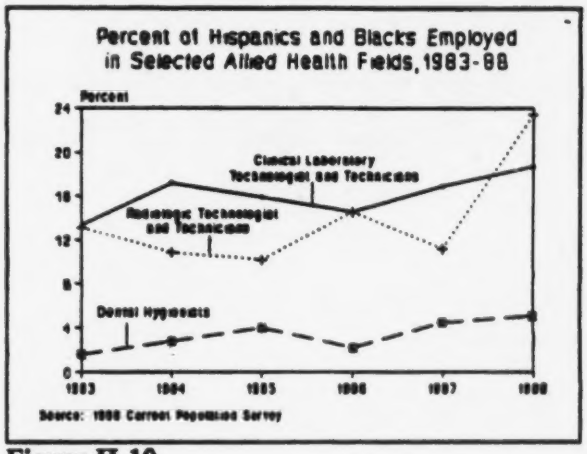

Figure II-10

- *Elderly persons, by far the largest per capita users of health care services, are increasing more rapidly than the rest of the population. This growth will continue well into the 21st century, slowing between 1990 and 2010, and then mushrooming between 2010 and 2030 as the post World War II population reaches age 65.*

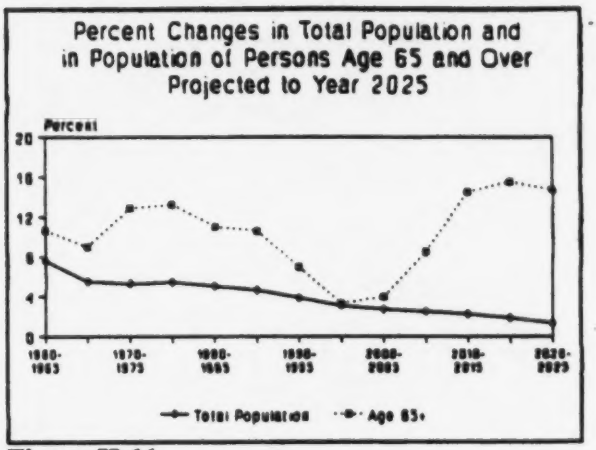

Figure II-11

- *Since the number of persons 85 and above will grow markedly, increased demand for long term care providers is anticipated.*

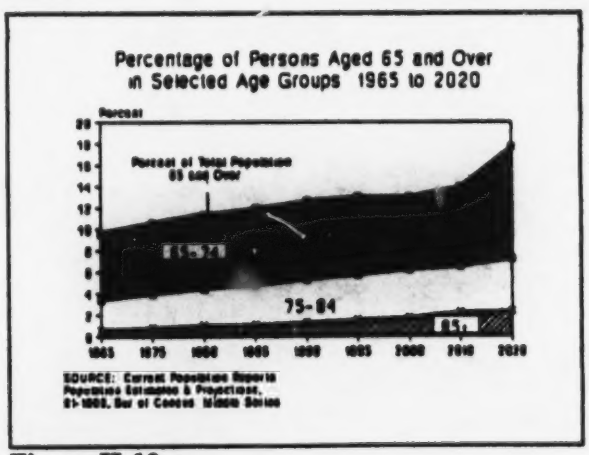

Figure II-12

- *Substance abuse and AIDS will continue to be major health problems in the years ahead, creating a demand for health personnel with specialized training in these areas. Many training programs for health care personnel have begun to integrate substance abuse and AIDS content into educational programs.*

- *Changes in methods of payment for medical services, emphasis on cost containment, advances in technology, increased attention to quality of care concerns, and changes in the case mix and treatment methods will continue to have an impact on the structure and delivery of services of the health care industry. Responsive changes in the training and functions of health personnel will be needed.*

Health Personnel in the Coming Years

- *Relatively slow growth in the supply of most health professions is expected in the years ahead, especially between the years 2000 and 2020. The slowing of growth reflects the smaller size of graduating classes during the late 1980s and early 1990s and increasing attrition among practicing health care professionals due to death and retirement.*

- *Although the rate of growth will slow in the short run, the numbers of personnel and ratio to population will continue to rise in medicine and most other health professions. However, geographic maldistribution and problems of access to care in rural and inner city areas and for some population groups are expected to continue.*

- *The numbers of active nurses and dentists, after rising somewhat above 1988 levels through the early years of the twenty-first century, are now projected to be lower in the year 2020 than in 1988. The number of nurses, 1,710,000 in 1988, will peak at 1,950,000 in 2005 and then drop to 1,640,000 in 2020. The number of RNs per 100,000, which was 670 in 1988, will decline after 2005 to a level of 558 per 100,000 in 2020. The supply of dentists will peak by the year 2000 at 155,000 or 58 dentists per 100,000 population and then decline to 141,000 or 48 per 100,000 by 2020, compared with 147,000 dentists and 59 per 100,000 population in 1988.*

In view of the major changes occurring in the health care delivery system and in health professions schools, it is difficult to say with any certainty that the supply of health personnel will be adequate to meet the Nation's requirements for health care in the future, particularly after the year 2000. In medicine it appears that the overall supply of physicians will be more than adequate to meet the Nation's needs and could very well increase faster than the demand. However, despite general physician availability, some areas cannot secure enough physicians to meet their health care needs. Both urban and rural poor have actually lost ground. Throughout the U.S. there is an average of 82.4 physicians per 1,000 population, but only 20.4 physicians per 1,000 in designated health manpower shortage areas. Available evidence indicates that persons trained for practice in specialized areas--particularly in nursing, public health, and allied health--may remain in short supply.

Chapter IV

CURRENT AND EMERGING PERSONNEL ISSUES

Introduction

In the previous chapter seven current and emerging health issues were discussed. They were selected because of their importance as health problems and their impact on health personnel supply and requirements. Changes in the health care delivery system are affecting the demand for health personnel. Prospective payment for hospital services, for example, has increased the acuity level of patients because of earlier discharge. Delivery system changes have influenced the distribution of and demand for health personnel in different practice sites, increasing the importance of ambulatory care settings. Aging of the population, the spread of AIDS, and increases in substance abuse will further increase demands for health personnel.

The discussion of health issues made clear that personnel required to address current and future health problems cut across a broad range of disciplines and specialties. Thus, the recurring theme of the introductory chapters and, indeed, of this entire report is the need for a multidisciplinary approach to the solution of health problems.

The seven personnel issues selected for discussion in this chapter have long term policy implications for health personnel supply, requirements, distribution, and training. The data will show that supplies of health personnel in most disciplines have been increasing since the 1960s and it is expected that they will continue to increase, although at slower rates than in the past. Growth in the number of physicians, many practicing in specialized areas, has not solved the problem of access to care among the disadvantaged residents of inner cities and those living in rural areas. There continues to be a shortage of physicians in primary care--the comprehensive and continuing care that a patient receives in the initial contact with the health care delivery system. Other health professionals can also provide primary care services and a coordinated, multidisciplinary approach can help meet the long range need for such care. An important area of primary care--prenatal care--can help reduce the high infant mortality rate among certain segments of the population.

Underrepresentation of minorities in the health professions is an important cross-cutting issue. Underrepresentation affects availability of primary care in many communities, which, in turn, adversely affects health status among minority populations. High infant and maternal mortality rates among certain minority population groups are attributable at least in part to inadequate health services in the pre- and postnatal periods.

Despite progress made in expanding the supply of health personnel--*in* numbers, and levels of educational preparation--gaps continue to exist. The discussion of personnel issues that follows will describe these gaps.

NURSING SHORTAGE

What has been designated as the "nursing shortage" is related to an imbalance between the number of active nurses and the fast-growing demand for nurses, particularly registered nurses with baccalaureate or higher education. During the mid-1980s the question of adequacy of the registered nurse supply to satisfy the national demand for nursing services became a major issue. The issue, given much prominence by the media, was the focus of a number of legislative and executive initiatives. A Commission on Nursing, appointed in 1988 by Secretary Bowen of the Department of Health and Human Services, reviewed the nursing shortage issue intensively. This section highlights the major points about the nursing shortage and discusses the suggested solutions with emphasis on the Commission's conclusions.

The Commission, consisting of 25 members drawn from nursing, other health care areas, and the public, concluded in its Interim Report that ". . . the reported shortage of RNs is real, widespread, and of significant magnitude." (DHHS, 1988a). In assessing the cause of the shortage, the report concluded that it was . . . primarily the result of an increase in demand as opposed to a contraction of supply. The RN supply continues to grow, but the number of new graduates has declined, and there are strong indications that RN supply has not kept pace with increased demand. Along with considerable documentation of shortages in the hospital area, the report noted evidence of shortages throughout the health care system.

Demand for Registered Nurses

While the total number of nursing personnel (registered nurses, licensed practical nurses, and nurse aides) employed in hospitals has decreased, the number of registered nurses employed has increased as hospitals have begun raising the skill level of their nursing personnel. Data from the American Hospital Association annual surveys show that between 1982 and 1987 total nursing personnel in hospitals decreased 7 percent while the number of registered nurses increased 3 percent. In community hospitals, where the majority of nursing personnel are employed, the ratio of full-time equivalent registered nurses per 100 adjusted patient census increased from 77 in 1982 to 98 in 1987.

Despite the increase in number of registered nurses employed, hospitals have been reporting serious shortages. A study carried out by the American Hospital Association's Center for Nursing in December 1987 reported an average hospital vacancy rate of 11.3 percent (AHA, 1987). Preliminary data from a second study conducted in December 1988 by the same organization reported an average vacancy rate of 10.6 percent, suggesting a slight decline in the rate. Other measures of shortage also do not appear to show much change

and another survey by the American Hospital Association, found that the personnel category with the most serious shortage was registered nurses (AHA, 1989).

A number of statistical analyses of the nursing shortage in hospitals have been carried out (summarized in chapter VIII). Despite use of what would appear to be sound analytical models, none of the studies provided a basis for a comprehensive understanding of reasons why demand for registered nurses exceeds the supply. More intensive study of this question would seem to be warranted.

Although extensive data that would allow for the same type of analyses are not available for the non-hospital sectors of the health care system, there is evidence that concerns about level of care in nursing homes could be exacerbating an already chronic shortage situation. A study by the Institute of Medicine points to the need of nursing home residents for careful assessment and care planning that require professional skill and judgment. The study emphasizes that much nursing home care is carried out by poorly trained, inadequately supervised nurse aides caring for more residents than they can properly serve. The Omnibus Budget Reconciliation Act of 1987 stipulated requirements for registered nurse staffing above the level that most nursing homes now have. Yet, according to data in the national sample surveys of registered nurses conducted by the Division of Nursing, BHPr, the number of registered nurses employed in nursing homes and related care facilities declined between November 1984 and March 1988, from 115,200 to 107,800.

On the other hand, the number of nurses employed in home health care has increased, although the number of Medicare home health visits has declined. Adequate data sources do not exist to count the total number of both Medicare and other types of home health visits. Two possible conclusions may be that there was an increase in the number of non-Medicare home health visits brought about by restrictions in approval of these visits by Medicare and/or an increase in the complexity of the home health cases, thus requiring longer visits by registered nurses.

As indicated in chapter VIII, it is anticipated that changes in health care delivery, trends in nursing, and in characteristics of the population to be served would cause future requirements for registered nurses to increase. Thus, while the cause of the current shortage has been attributed to employer demand, questions of the adequacy of the supply need to be examined as well.

Registered Nurse Supply

Both the total number holding licenses to practice as registered nurses and the number of employed registered nurses are increasing. In the March 1988 National Sample Survey of Registered Nurses, there were an estimated 2,033,000 registered nurses, an increase of 7.7 percent over the number found in a similar survey of November 1984, which preceded the nursing shortage (Moses, 1984). The number of employed RNs increased 9.5 percent, from 1,486,000 in 1984 to 1,627,000 in 1988. An even greater increase was shown for those employed in nursing on a full-time basis: an estimated 984,300 in 1984 compared with 1,099,600 in 1988, an increase of 11.7 percent (figure IV-C-1). Thus, the number of

registered nurses continued to increase during the recent period of mounting vacancies and other evidences of shortages.

Enrollment in schools of nursing is a major factor affecting the supply of registered nurses. Admissions to programs preparing students to become registered nurses significantly declined between the 1983-84 academic year and the 1986-87 year. Although admissions in the 1987-88 academic year increased 4.3 percent over the prior year, the number of new students remained considerably lower than the number in each of the years before 1983-84. It is too early to determine whether this one year of increase is an indication of increases for future years.

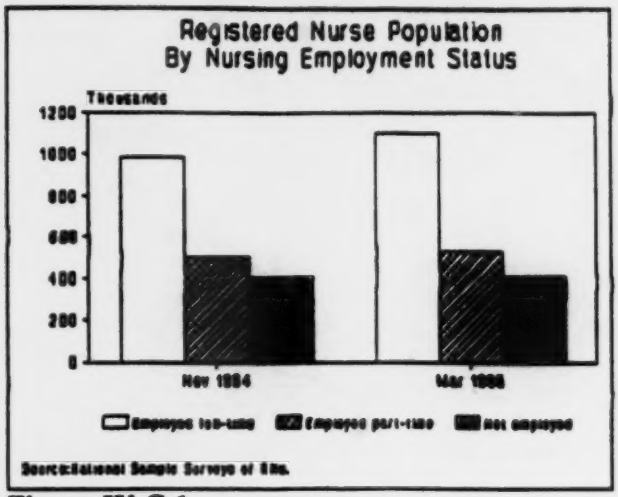

Figure IV-C-1

Other factors affecting the supply are the extent to which registered nurses will be actively employed in nursing and the extent to which they will maintain their licensure. The 1988 sample survey shows that 80 percent of all licensed RNs are actively employed in nursing, an increase over previous years. However, the activity rate decreases with age for any given time, from about 97 percent for those under 25 to 70 percent for those in the 55-59 year age group, to 36 percent for those aged 60 and over.

As pointed out in chapter VIII, the age level of registered nurses is increasing due to declining numbers of new graduates coupled with the older age of more recent graduates. Assuming that no significant changes in the current behavior patterns of registered nurses would occur, and taking into account the potential available student body, projections of supply included in chapter VIII show that while the active supply will increase for the next 15 years, there will be persistent and substantial declines thereafter. Given continuing current trends in supply of and requirements for registered nurses, it is anticipated that, despite supply increases through the year 2005, requirements will outstrip the number available.

Composition of Registered Nurse Population

Registered nurses are almost all female. The proportion of male RNs working in March 1988 was only slightly higher than in November 1984, 3.3 percent compared with 3 percent. Thus, while many of the predominantly male health professions show significant increases of women professionals, nursing has not succeeded in attracting large numbers of men.

Registered nurses are also predominantly white, non-Hispanic. Despite the increase in the number of registered nurses between 1984 and 1988, the numbers of those of minority racial/ethnic backgrounds showed little change. Only 7.6 percent of the RN population in 1988 had minority backgrounds, about half of whom were Black, non-Hispanic.

Compensation of Registered Nurses

Data in chapter VIII show that salary levels for beginning registered nurses are in line with other beginning professionals. Also, the average salary of full-time employed staff nurses has increased 21 percent between 1984 and 1988, from $21,700 to $26,300. However, about two-thirds of all registered nurse positions are staff positions and the majority of registered nurses remain in staff positions throughout their careers. Studies show that the difference between the average salary for a beginning nurse and the average salary for all employed staff nurses is less than $4,000. Also, the average salary for an administrative position in 1988 was $34,600, a difference of only $8,300 between a staff and an administrative position, the highest level in nursing. Therefore, it should be noted while nurses begin at a salary equivalent to that of other beginning practitioners, the highest salaries they can expect in their careers are not much higher than their beginning salaries.

Solutions for the Nursing Shortage

Groups studying the issues involved in ensuring an adequate supply of registered nurses, including the Secretary's Commission on Nursing, have pointed to the twofold nature of the solution: increases in nurse productivity and increasing the attractiveness of a nursing career. In particular, the Commission cited a number of interventions to alleviate the current shortage and assure an appropriate level of future nursing resources. Recommendations were developed from both demand and supply sides of the nursing shortage issue: utilization of nursing resources, nurse compensation, health care financing, nurse decision-making, and development and maintenance of nursing resources.

In the area of utilization of nursing resources the recommendations were designed to promote the most effective use of registered nurses through provision of adequate clinical and nonclinical support services; development of staffing patterns that would appropriately utilize different levels of registered nurses as well as other nursing personnel responsible to registered nurses; development and adoption of automated information systems and other labor saving technologies to increase registered nurse productivity; and development and implementation of methodologies to determine and track nursing resource costs and utilization for more effective internal management.

The Commission's recommendations in the area of compensation related both to demand and supply. Provision by health care delivery organizations of adequate and appropriate compensation for nurses was seen as leading to more effective utilization of nursing resources, retention of nurses by their employers and within the nursing profession, and improvement in attractiveness of nursing as a career. In addition, the Commission felt that failure to recognize the registered nurse's decision-making ability affected the attractiveness of nursing as a career and placed limitations on patient care delivery. A series of

recommendations were made, therefore, that included nurses in policy-making areas both within the health care delivery organization and in the health care system's public and private governing bodies.

The final set of recommendations pertained to the development and maintenance of nursing resources (DHHS, 1988b). The Commission indicated that, while the current nursing shortage was assessed as demand-driven, the decrease in nursing school enrollments may precipitate growing shortages in the future. It was felt that there was also some cause for concern in the distribution of registered nurses across specialties and employment settings and in the preparation of nurses for current clinical practice requirements. Accordingly, recommendations were made for increasing availability of nursing education, examining the curricula, and improving the public image of nurses.

The Commission recommended that, to maintain the appropriate level of nursing resources in the future, efforts needed to be devoted to monitoring nursing resources and the nursing labor market and to carrying out research and demonstrations to examine the effects of various factors on the attractiveness of a nursing career and on the health care delivery system. A need was also seen to monitor implementation of the recommended courses of action prescribed in the Commission report.

The Assistant Secretary for Health has approved a plan developed by the U.S. Public Health Service (PHS) to implement the Commission's recommendations. The plan coordinates PHS activities underway in areas such as research, financial assistance, and program development. It establishes new initiatives through reexamination, priority setting, and targeting. It further includes liaison activities with the private sector and other public entities for reducing nursing shortages.

Specifically the implementation plan contains nine objectives, grouped into three broad categories: resource utilization, resource development, and resource maintenance. Essentially, the resource utilization objectives address the need for developing, demonstrating, and evaluating cost-effective methods for utilizing nursing, allied health, and support personnel. In resource development, the plan calls for a reexamination of legislative strategy regarding nursing education. For resource maintenance, the need for monitoring and assessing nursing supply and demand is recommended.

In another action to implement the Commission's recommendations the Bureau of Health Professions contracted with the Project Hope Center for Health Affairs, to provide an action plan for establishing a database within a nursing and a continuing strategy to meet critical nursing data needs. A meeting of experts in September 1989 helped initiate development of the action plan. A meeting in October 1989 of another group of experts examined new projection models for nursing personnel.

Finally, in another development Congress enacted the Nurse Shortage Reduction and Education Extension Act of 1988 (Title VII of P.L. 100-607). A number of its provisions address approaches to broadening the base for recruitment into nursing and to making nursing a more attractive career in order to retain those already in nursing. The U.S. Department of Health and Human Resources (DHHS) is implementing both the programs

with continuing authorization and those newly authorized, such as the scholarships for undergraduate education, that contribute to enhancing the available nursing supply.

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Chapter VIII

NURSING

This is the seventh report to the Congress in response to the statutory requirements in section 951 of P.L. 94-63 as amended in section 12(h), P.L. 95-623. Those requirements direct the Secretary to provide reports on the current and future supply and distribution of and requirements for nursing personnel within the United States and within each State.

The scope of the reporting requirements is very broad, encompassing about 3-4 million individuals, including registered nurses, licensed practical/vocational nurses, and ancillary nursing personnel. In recognition of various levels of practice and responsibilities and the corresponding necessary qualifications, the reporting requirements call for data on supply and distribution of and requirements for registered nurses with advanced training or graduate degrees, including nurse practitioners. Section 951 also requires the gathering of data on the number of nurses working, those practicing full time and part time, type of employment and locations of practice, compensation levels, and annual entrants from other countries. Fulfilling these requirements involves the collection and summarization of data from a variety of sources as well as the development of detailed projections for a number of factors. Finally, reporting requirements call for the Secretary to make recommendations that will aid in achieving an equitable distribution and adequate supply of nurses within the United States and each State.

Focusing on registered nurses, the material in this report builds upon previous reports and presents new data, including findings from the recently completed National Sample Survey of Registered Nurses, March 1988, carried out by the Division of Nursing, Bureau of Health Professions, Health Resources and Services Administration.

Latest comprehensive data available for licensed practical/vocational nurses is from the 1983 National Sample Survey of Licensed Practical/Vocational Nurses (Jones, 1985). Significant changes have occurred in staffing configurations for the delivery of care as well as modes of delivery that have materially affected the use of licensed practical/vocational nurses. These changes could have seriously affected the overall supply and availability of these nurses. Lack of current, complete data precludes development of current and future estimates of the supply and distribution of and requirements for licensed practical/vocational nurses.

Only limited information is available on the characteristics of those who fill ancillary nursing positions (nursing aide, orderly, home health aide). These individuals are mainly

on-the-job trained or receive training in relatively short-term educational courses and are, for the most part, not licensed or certified.

Ideally, discussion of characteristics of nursing personnel should at least provide data on the two occupations within nursing that require formal education and licenses to practice: registered nurses and licensed practical/vocational nurses. But there are no recent descriptive data on licensed practical/vocational nurses similar to that on registered nurses. The Current Population Survey, conducted by the Bureau of Census for the Bureau of Labor Statistics, does provide estimates for the licensed practical/vocational nurse population (as well as for registered nurses and nursing aides). The Current Population Survey, however, unlike the sample surveys that collect data from licensed personnel, obtains its data through household surveys in which the household members may belong to one of a variety of occupations. Thus, ambiguous or incomplete responses in the Current Population Survey may result in misclassification of occupations, particularly for closely related occupations such as the three within nursing. These misclassifications could affect the data describing the characteristics of each group.

Also, certain definitional differences exist. For example, studies of nurses classify all those in positions requiring nurses as being in nursing employment so that, for example, nurses who are teachers educating nursing students are considered in nursing employment. The occupational system followed in the Current Population Survey would classify these individuals as teachers, not nurses.

Finally, a review of annual data on the estimates of individuals within each of the nursing occupations from the Current Population Survey shows wide fluctuations from year to year. Since the two licensed occupations require formal education for entry, it would seem unlikely that such fluctuations would occur. Available data from other studies in which the nurse was the subject or in which employers identify the type of employee they have hired demonstrate that such fluctuations are not likely.

The Current Population Survey data are helpful in the general sense of placing the occupations within the perspective of the total occupational distribution of the country's work force. However, given the limitations identified above, the data would not be appropriate to include in a discussion requiring a more precise characterization of the occupational group.

Current Developments in Nursing Education

Registered nurses and practical/vocational nurses are prepared in formal educational programs. The programs for registered nurses include both entry into nursing and advanced or post-RN levels. Entry level programs for both registered and practical nurses are reviewed and approved for the preparation of individuals by each of the State Boards of Nursing to take the licensure examination. For many years the National League for

Nursing has carried out annual studies of entry programs for both types of nurses and the post-RN programs (NLN, various years). Data from these studies provide the basis for an analysis of trends in numbers of programs and their student bodies.

Basic Nursing Education to Prepare for Registered Nurse Licensure

Programs, Students and Graduates. Preparation to become a registered nurse may be obtained in various settings. The programs in each setting vary in length and provide different credentials upon completion. All graduates, however, take the same licensing examination, which measures "minimum safe practice," and all are licensed as registered nurses. As of October 1988 there were 1,443 basic nursing education programs preparing for registered nurse licensure. This number has decreased from 1,477 in 1984, the highest level in recent years, mainly due to a decline in the number of diploma programs. These programs, primarily 3 years in length and located in hospitals, were, until the 1970s, the major preparers for registered nurse licensure. Since that time, their number has steadily decreased to 171, only 12 percent of all programs.

Associate degree programs, usually 2 years in length and located in community colleges, were first established in the early 1950s. Fifty-five percent, or 792, of the programs in October 1988 were associate degree programs, an increase of 16 since October 1984.

The number of baccalaureate programs has increased. In 1988 they numbered 480 compared with 427 in October 1984. Baccalaureate programs are most often in colleges or universities and require at least 4 years of academic preparation. The length of the program varies according to which year students are admitted -- freshman, sophomore, or junior year. In recent years there has been a shift to admission at the sophomore or junior year. Included in the count of baccalaureate programs are six master's degree and two doctoral programs that provide initial preparation for licensure as a registered nurse.

Recent concerns about a shortage of registered nurses have centered in part on the availability of applicants for nursing programs. Since there is no unduplicated list of applicants to nursing programs, the focus has been put on the number of admissions, or first-time enrollments. The number of admissions had declined from its peak of 123,824 in the 1983-84 academic year to 90,693 in the 1986-87 academic year (figure VIII-1). However, in the 1987-88 academic year, admissions to nursing education programs rose 4.3 percent, to 94,594. Although all three types of programs showed some increase, associate degree programs had the largest increase with 5.7 percent more admissions than in 1986-87.

Along with the increase in admissions to programs preparing for registered nurse licensure, there is an increase in total enrollments (figure VIII-2). As of October 1988 enrollments numbered 185,962, compared with 182,947 for 1987. This increase, however, is due to the larger number of students in associate degree programs, which rose from 90,399 in 1987 to

96,387 in 1988. Total enrollments in the other two types of programs continue to reflect the decreases in admissions of earlier years. Similarly, the graduation totals for the 1987-88 academic year, in line with the sizeable 3-year decrease in admissions registered before 1987-88, declined 8 percent (figure VIII-3). Data on admissions and graduates in each state for academic year 1987-88 are shown in table VIII-A-1.

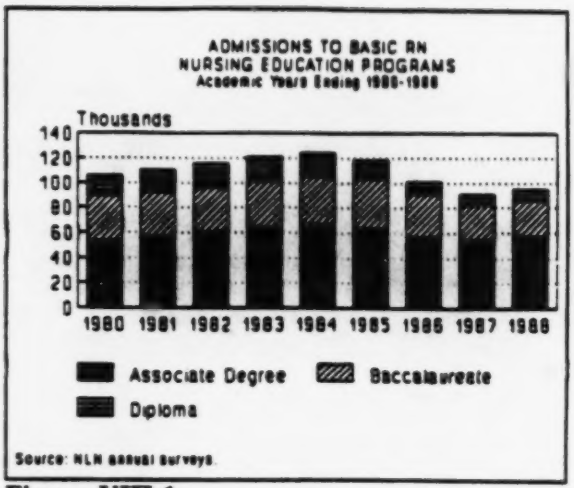

Figure VIII-1

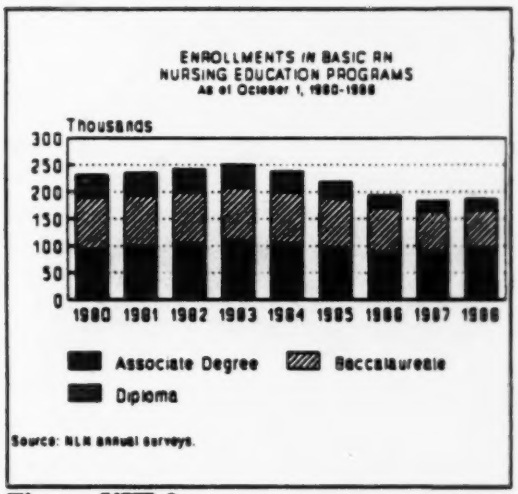

Figure VIII-2

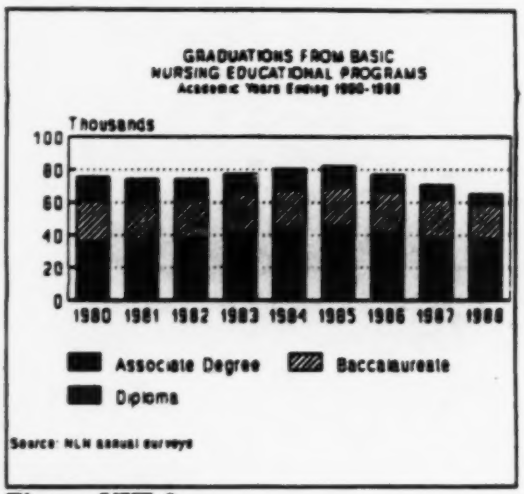

Figure VIII-3

Student Characteristics in Basic RN Programs. According to the latest available data from the National League for Nursing in mid-1989, about 7 percent of admissions to basic RN programs in the 1986-87 academic year are men. Almost 17 percent of admissions in 1986-87 were from racial/ethnic minority backgrounds. Most of these (10.9 percent of total admissions) were Black, non-Hispanic. Associate degree programs are most likely to have men and racial/ethnic minorities among their admissions while the diploma programs are least likely to have such admissions.

Among the three types of basic nursing education programs, the associate degree programs, with about 18 percent of their admissions from racial/ethnic minority groups, were the most

likely to have such admissions. Diplomas programs, with 13 percent of their admissions from racial/ethnic minority groups, were the least likely. Associate degree programs were also most likely to have men enrollees (7.6 percent of the 1986-87 admissions) and the diploma programs, the least likely (5.9 percent of their admissions).

Costs to the Students. For the 1987-88 academic year, the National League for Nursing reported that the average annual tuition in a publicly supported basic program was $1,388 for students who were residents of the State and/or county in which the school was located. In privately supported schools, the average was $4,738. These costs exclude laboratory and similar fees.

Average tuition costs in both publicly and privately supported schools have increased since the 1985-86 academic year, perhaps partly due to newly instituted fees. The largest increase (65 percent) occurred in the publicly supported associate degree programs, which comprise 88 percent of programs. Privately supported baccalaureate programs, 50 percent of programs, had the highest tuition costs, averaging $6,150 in the 1987-88 academic year.

Limited information on ways students finance their nursing education is available from a survey of 1985-86 college graduates conducted by the National Center for Education Statistics, U.S. Department of Education. As a result of an interagency agreement between the Bureau of Health Professions and the Center, information on graduates of basic baccalaureate nursing programs was obtained from the survey. According to the survey, a relatively large group of those graduates received some type of loan or scholarship financial support. About 73 percent of the estimated 18,075 graduates applied for some type of financial aid, Federal, State and/or other governmental or private, and most applicants (84 percent) were awarded aid. Average amount borrowed by students was $8,988, with an average of $6,115 still owed after graduation.

A recently published study by the American Association of Colleges of Nursing, with funding from the Pew Charitable Trusts, found that the average total indebtedness for generic baccalaureate students is $12,939 in private institutions and $10,056 in public institutions, based on data from case studies in 10 colleges and universities (AACN, 1989). The study reported that the average total cost for the generic baccalaureate student, including foregone earnings, is $115,279 in private colleges and $95,794 in public institutions. The net income foregone is estimated at $76,456.

Post-RN Academic Nursing Education

Graduate programs provide nurses the important preparation for leadership positions. As researchers, administrators, teachers, and expert clinicians, these people provide the management structure and guidance to assure the sound practice of nursing in all the health care system. In addition to advanced nursing education programs, individuals already

licensed as a registered nurse may also seek baccalaureate nursing education if their initial education was in an associate degree or diploma program.

Post-RN Baccalaureate Programs. As of October 1987, there were 46,375 registered nurses enrolled in baccalaureate programs. The majority (57 percent) attended the same programs in which students receiving their initial nursing education were enrolled and were mainly full-time students. However forty-three percent were enrolled in the 196 baccalaureate programs specifically designed for the post-RN student and only 26 percent of these were full-time students.

In the 1986-87 academic year, there were 10,714 post-RN graduates from baccalaureate programs. Fifty-eight percent had previously earned associate degrees and 42 percent were graduates of diploma programs. Both enrollments (19 percent) and graduations (20 percent) among post-RN students have increased since 1983.

Master's Degree Programs. According to the latest data from the National League for Nursing, there were 194 master's degree programs in 1987, an increase of 5 programs over the previous year and 40 since 1983. As of October 1987, there were 21,195 registered nurses enrolled in nursing master's degree programs, increases of 6 percent over the prior year and 17 percent since 1983. Although through the late 1970s a majority of master's degree students were full time, in 1987, 71 percent were part-timers. Graduations from master's degree programs in 1986-87 totaled 6,029, a 15-percent increase in a year.

Doctoral Programs. Nursing doctoral students numbered 2,133 in 45 programs on October 1987. Between 1983 and 1987, 18 new programs were established and enrollments increased almost 43 percent. The proportion of students attending school in 1987 on a full-time basis (48 percent) has also increased substantially from 1986 (40 percent). A total of 257 registered nurses received doctorates in the 1986-87 academic year.

Other Programs Providing Advanced Nursing Skills. A number of programs grant certificates for advanced studies in addition to programs offering master's or doctoral degrees. Although a complete listing is not available, data collated by the Division of Nursing in 1989, show that 28 of 113 schools with nurse practitioner or nurse midwifery programs award certificates. Among the 113 are 25 schools that offer nurse midwifery programs 8 award certificates. Programs in the remaining schools confer master's degrees upon completion.

A number of nurse anesthetists programs also present certificates. Of the 94 programs listed by the Council on Accreditation of Nurse Anesthesia Educational Programs in June 1988, 31 are certificate programs. Nine offer a bachelor's degree or confer one upon completion on an optional basis. As was the case for the nurse practitioner and nurse

midwifery programs, however, the majority (54) are master's degree programs or provide a master's degree at completion on an optional basis.

Costs of Educating Nursing Students

The costs to institutions for educating nursing students are not easily obtained. Because nursing programs are not usually located in free standing entities, some expense components are commingled with those of other programs operated by the schools.

One aspect of the cost of operating an educational program that has been studied recently, however, is that of the cost to hospitals of providing clinical experiences for students. In response to requirements in the Consolidated Omnibus Reconciliation Act of 1985 (Section 9202(c)(1) of P.L. 99-272), the Bureau of Health Professions studied hospitals receiving reimbursement under Medicare for nursing and other nonphysician health professions educational programs. The report of the study, issued in March 1988, noted that $533 million was reported for nursing education costs from October 1984 to September 1986. (DHHS, 1988a). Although the study design did not require a complete accounting of all programs receiving reimbursement, the report noted that hospitals were receiving reimbursement for nursing educational costs for all types of programs, those they directly operated and those for which they served as a clinical site for programs operated by others at the basic or graduate level. The study investigated fiscal and administrative relationships between the school operating the program and the hospital, the cost incurred by the hospital, and the financial and nonfinancial benefits to the hospital from the program. The most important benefit cited by most hospitals was ability to recruit staff. The recent study by the American Association of Colleges of Nursing confirmed this finding (AACN, 1989).

Further activity in this area will be carried out as a result of the requirements in Section 8411(a) of the Technical and Miscellaneous Revenue Act of 1988 (P.L. 100-647). The Division of Nursing, BHPr, in cooperation with the Health Care Financing Administration, is conducting demonstrations designed to allow a hospital to be reimbursed for reasonable costs incurred for activities in connection with a clinical component of an approved educational program leading to a master's or doctoral degree in nursing.

Programs Preparing Practical Nurses

Practical nursing programs are generally 12 months in length. While the majority are located in adult vocational educational settings, a sizeable proportion are in community colleges. The 1,035 programs in 1987 were substantially fewer than the number in 1984, 1,254. There also has been a significant decrease in the number of graduates: 27,285 in the 1986-87 academic year compared with 44,654 in 1983-84. Table VIII-A-2 provides data on admissions and graduations in each state in 1986-87.

Current Developments in the Registered Nurse Population

The Registered Nurse Supply

As of March 1988 there were an estimated 2,033,032 individuals in the United States with current licenses to practice as registered nurses, according to the fourth National Sample Survey of Registered Nurses (DHHS, 1990). An estimated 1,627,035 were employed in nursing (80 percent), the majority, on a full-time basis (table VIII-1).

Table VIII-1

DISTRIBUTION OF REGISTERED NURSE POPULATION BY EMPLOYMENT STATUS, MARCH 1988

	ESTIMATED NUMBER	PERCENT
TOTAL WITH LICENSES TO PRACTICE	2,033,032	100.0
EMPLOYED IN NURSING	1,627,035	80.0
EMPLOYED FULL-TIME	1,099,576	54.1
EMPLOYED PART-TIME	526,489	25.9
EMPLOYED IN OTHER OCCUPATIONS	114,064	5.6
HEALTH-RELATED OCCUPATION	50,144	2.5
NON-HEALTH-RELATED OCCUPATION	62,549	3.1
TYPE OF EMPLOYMENT NOT KNOWN	1,371	0.1
NOT EMPLOYED	291,933	14.4

Both total RN population and number employed in nursing are increases over the numbers found in prior national sample surveys. The registered nurse population is 45 percent larger in the 1988 survey than in the first study (September 1977) and about 8 percent larger than in the November 1984 study. The number of employed nurses increased at an even greater rate than the overall registered nurse population. Thus, along with increases in the number of nurses, increases occurred over the years in the proportion who were employed in nursing (table VIII-2).

Table VIII-2

EMPLOYMENT RATE OF REGISTERED NURSE POPULATION, 1977-1988

	TOTAL RNs		EMPLOYED IN NURSING			NOT EMPLOYED IN NURSING
			TOTAL	FULL-TIME	PART-TIME	
DATE	EST. NUMBER	PERCENT	PCT.	PCT.	PCT.	PCT.
SEPT. 1977	1,401,633	100.0	69.8	47.5	22.2	30.2
NOV. 1980	1,662,382	100.0	76.6	51.4	24.4	23.4
NOV. 1984	1,887,697	100.0	78.7	52.1	26.6	21.3
MARCH 1988	2,033,032	100.0	80.0	54.1	25.9	20.0

Nurse Immigrants

Although most additions to the registered nurse population come from United States programs, a small proportion are graduates of schools in other countries. About 73,000, or less than 4 percent of the 2 million registered nurses were from such schools (1988 survey).

Not all nurses who immigrate obtain a license to practice here. To gain licensure, they must pass licensing examinations in each State. According to the latest data published by the National Council of State Boards of Nursing, in July 1987, 41 percent of foreign-educated nurses passed the examination the first time they took it, compared with 91 percent of graduates of U.S. schools (NCSBN, 1989). Foreign nurses retaking the examination also did less well than U.S. graduates, 16 percent passing compared with 48 percent.

A total count of nurse immigrants is not available because occupational background data are not always given when individuals enter the country. However, the Immigration and Naturalization Service (INS) identified 4,063 nurses who immigrated in 1988, about the same as in previous years. The majority are from Asia.

In addition to those who enter the country on a permanent immigration visa, a number of individuals enter as temporary workers on H-1 visas. According to INS, when adjustments are made for occupational underreporting and for those departing the country during their entry year, the estimated number of nurses who entered on H-1 visas in Fiscal Year 1988 was 9,151. This number is considerably higher than that for each of the 3 preceding fiscal years. Almost three-quarters of those entering on H-1 visas since FY 1985 are from the Philippines.

Characteristics of Registered Nurses

Table VIII-3

DISTRIBUTION OF REGISTERED NURSE POPULATION BY RACIAL/ETHNIC BACKGROUND AND EMPLOYMENT STATUS, MARCH 1988

	TOTAL		RNs EMPLOYED IN NURSING		RNs NOT EMPLOYED IN NURSING	
	EST. NUMBER	PERCENT	EST. NUMBER	PERCENT	EST. NUMBER	PERCENT
TOTAL RN POPULATION	2,033,032	100.0	1,627,035	100.0	405,997	100.0
WHITE (NON-HISPANIC)	1,864,157	91.7	1,479,093	90.9	385,063	94.8
BLACK (NON-HISPANIC)	73,647	3.6	65,304	4.0	8,343	2.1
ASIAN/PACIFIC ISLANDER	46,691	2.3	44,210	2.7	2,481	0.6
AMERICAN INDIAN/ALASKAN NATIVE	8,358	0.4	7,129	0.4	1,229	0.3
HISPANIC	26,163	1.3	22,140	1.4	4,023	1.0
NOT KNOWN	14,016	0.7	9,159	0.6	4,857	1.2

Racial/ethnic minority background. Despite the increase in the number of registered nurses between the 1984 and 1988 studies, there was little change in the number from racial/ethnic minority backgrounds, and estimated 155,000 in both years. Almost half were Black (table VIII-3). Minority nurses are more likely to be employed in nursing. In March 1988, 8.5 percent of the 1.6 million employed registered nurses were from racial/ethnic, minority backgrounds.

Age Distribution. The median age (39 years) of the registered nurse population in March 1988 was unchanged from November 1984, although, the age distributions were different (figure VIII-4). For example, in March 1988, less than 16 percent of nurses were under 30, but in November 1984 about 20 percent were in that age group.

Changes in age levels of the registered nurse population could be related to a number of factors that could materially influence availability of registered nurses in the future. One particular change, seen in sample survey data, is the older age at which individuals are graduating from basic nursing education programs and entering the registered nurse population. Graduates within the past 5 years had a median age at graduation of 25 in contrast to a median age of 23 for graduates of 5 to 10 years ago. This increase in the age at graduation is even greater for associate degree graduates, who are typically older than graduates from diploma and baccalaureate programs. The median age for recent associate degree graduates is 30 in 1988 in contrast to a median of 27 years for graduates of 5 to 10 years ago.

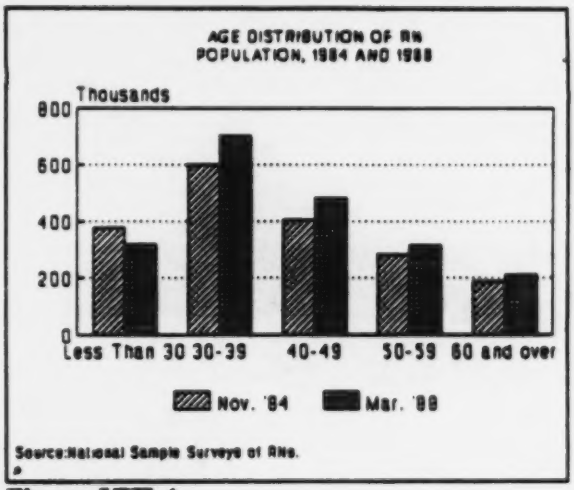

Figure VIII-4

The median age of employed nurses in March 1988 was 38. Almost 40 percent were under 35 years of age. In contrast, the median age of those not employed in nursing was 51, and about one-third were 60 years of age or over.

Educational Background of Registered Nurses. During the last decade, major changes have taken place in the educational background of the U.S. registered nurse population. The 1988 sample survey estimated that less than half the nurses had received basic nursing education in a diploma program compared to 75 percent in 1977. Conversely, as can be seen in table VIII-4, only 11 percent of nurses in 1977 were prepared in associate degree programs in comparison with 28 percent in 1988.

It is expected, that these trends will continue as diploma program graduates will be increasingly a smaller proportion of the total registered nurse population and associate degree graduates, an increasingly higher proportion. Among the registered nurse population in March 1988 who had graduated from initial nursing education programs within the last 5

Table VIII-4

DISTRIBUTION OF REGISTERED NURSE POPULATION BY TYPE OF BASIC NURSING EDUCATION, 1977-1988

	1977		1980		1984		1988	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
TOTAL	1,401,633	100.0	1,662,382	100.0	1,887,697	100.0	2,033,032	100.0
DIPLOMA	1,049,002	74.8	1,050,661	63.2	1,020,916	54.1	989,941	48.7
ASSOCIATE DEGREE	158,530	11.3	308,616	18.6	466,969	24.7	576,167	28.3
BACCALAUREATE	191,494	13.6	287,993	17.3	384,989	20.4	451,985	22.2
MASTER'S & ABOVE	(NOT AVAILABLE)		1,593	0.1	2,705	0.1	1,918	0.1
NOT KNOWN	2,607	0.2	13,520	0.8	12,116	0.6	13,021	0.6

years, 15 percent were from diploma programs and 53 percent from associate degree programs. Among those who had graduated 5 to 10 years earlier, 21 percent were from diploma programs and 46 percent from associate degree programs. About 32 percent of the newer registered nurses and 34 percent of those graduating 5 to 10 years ago were graduates of basic baccalaureate programs.

In addition to basic nursing education, many nurses obtain additional education, either in formal academic degree-granting programs providing preparation for advanced clinical, administrative, or teaching positions, or in continuing education programs providing specialized skills and techniques. About 18 percent, or 374,000, of registered nurses in March 1988, had earned additional degrees since completing their initial nursing education.

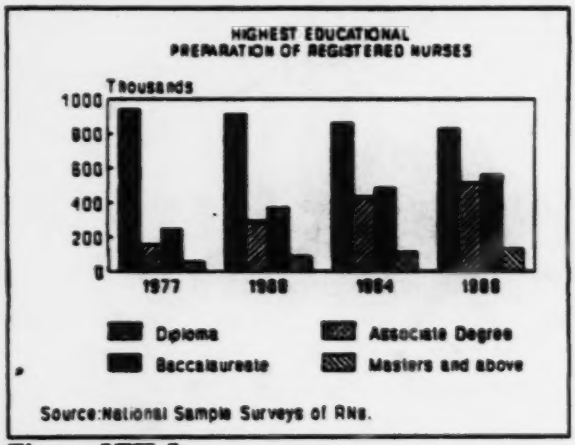

Figure VIII-5

Taking all nursing-related education into account, both the initial or basic education and the additional degrees earned since, as of March 1988 about 821,000 registered nurses have diplomas as their highest nursing education, 512,000 have associate degrees, and 557,000, baccalaureate degrees. About 125,000 have nursing or nursing-related master's degrees and 5,400, doctorates. The changing educational distribution can be seen in figure VIII-5.

Advanced Education. The shift in the focus of the specialty area of study for those with advanced education at the master's or doctoral levels, seen in the prior sample surveys, continues in the 1988 study. Clinical practice is now the predominant area with 50.7 percent (65,400) of nurses with master's or doctoral degrees estimated to have this

specialty. A little less than one-third specialized in some part of the clinical practice area in 1977 as compared with about 46 percent in 1984. While the predominant areas of concentration within clinical practice are still medical/surgical nursing, psychiatric/mental health, and maternal/child health, the number of nurses who specialize in geriatric/gerontology is estimated to have grown from 1,068 in 1984 to 3,529 in 1988.

Table VIII-5

REGISTERED NURSES WITH ADVANCED EDUCATION AT THE MASTER'S OR DOCTORAL LEVEL BY PRIMARY FOCUS OF DEGREE, MARCH 1988

			HIGHEST EDUCATION			
	TOTAL		MASTER'S		DOCTORATE	
PRIMARY FOCUS	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
TOTAL	128,939	100.0	123,637	100.0	5,302	100.0
EDUCATION	32,168	24.9	29,952	24.2	2,216	41.8
SUPERVISION/ ADMINISTRATION	25,402	19.7	25,121	20.3	281	5.3
CLINICAL PRACTICE	65,378	50.7	64,483	52.2	896	16.9
COMMUNITY/PUBLIC HEALTH	9,088	7.0	8,854	7.2	234	4.4
MATERNAL/CHILD	12,231	9.5	12,147	9.8	84	1.6
MIDWIFERY	1,531	1.2	1,531	1.2	0	0.0
GERIATRIC/GERONTOLOGY	3,529	2.7	3,482	2.8	47	0.9
MEDICAL/SURGICAL	19,340	15.0	19,340	15.6	0	0.0
PSYCHIATRIC/MENTAL HEALTH	13,497	10.5	13,046	10.6	452	8.5
OTHER CLINICAL PRACTICE	6,031	4.7	5,952	4.8	79	1.5
SPECIALTY UNKNOWN	131	0.1	131	0.1	0	0.0
RESEARCH	1,279	1.0	185	0.1	1,094	20.6
OTHER	3,929	3.0	3,144	2.5	785	14.8
NOT KNOWN	784	0.6	755	0.6	29	0.5

Those whose degrees are primarily focused on clinical practice or in administration or supervision are most likely to have a master's degree as their highest nursing or nursing-related preparation (table VIII-5). Among the 32,200 nurses with a specialty in education in 1988, about 7 percent had doctorates. Most of the 1,300 nurses whose specialty was research had doctoral degrees.

Nurse practitioners receive their advanced education in either a certificate program or master's degree program. Based on the responses to the 1988 sample survey, it is estimated that 63,000 registered nurses have had preparation as nurse practitioners. This includes about 19,000 with nurse midwifery preparation. About 77 percent received this preparation in certificate rather than master's degree programs. The course of study was fewer than 9 months for 25 percent of those with certificate program preparation; however, today's programs require a minimum of 9 months full-time study.

Geographic Distribution of Registered Nurses

California, with an estimated 192,000 registered nurses, and New York, with an estimated 179,000 nurses had the highest number of registered nurses in 1988. Pennsylvania, Illinois, Florida, and Texas each had over 100,000 nurses. These six States had 40 percent of the 2 million registered nurses in the country. Wyoming and Alaska, had the fewest nurses, 3,000 and 4,200, respectively (See table VIII-3).

In addition to variation in numbers there is variation in the proportion of total nurses employed in nursing. As seen in table VIII-6, nurses in the West North Central and the East South Central parts of the country are most likely to be employed in nursing.

Table VIII-6

PERCENT DISTRIBUTION OF REGISTERED NURSE POPULATION BY REGION AND EMPLOYMENT STATUS, MARCH 1988

REGION	TOTAL RNs	EMPLOYED IN NURSING			NOT EMPLOYED IN NURSING
		TOTAL	FULL-TIME	PART-TIME	
UNITED STATES	100.0	80.0	54.1	25.9	20.0
NEW ENGLAND	100.0	77.0	43.5	33.5	23.0
MIDDLE ATLANTIC	100.0	76.6	52.6	24.0	23.4
SOUTH ATLANTIC	100.0	78.7	57.4	21.3	21.3
EAST SOUTH CENTRAL	100.0	84.4	65.9	18.5	15.6
WEST SOUTH CENTRAL	100.0	79.5	64.2	15.3	20.5
EAST NORTH CENTRAL	100.0	80.7	51.6	29.1	19.3
WEST NORTH CENTRAL	100.0	84.9	54.4	30.5	15.1
MOUNTAIN	100.0	81.0	54.8	26.2	19.0
PACIFIC	100.0	83.0	51.5	31.5	17.0

Nurses in the West and East South Central regions are most likely to work on a full-time basis when employed in nursing (table VIII-6). While the New England area is among those with lower employment rates, nurses are more likely to work part-time when employed in nursing.

Because of large differences in size of State population, the ratio of nurses to population is a useful way of examining the geographic distribution of nurses. Although these ratios are used for comparison purposes, they are not a true measure of nursing services provided to the population. Concentration of nurses in a particular area is dependent in part on concentration of facilities or organized nursing services in which they can practice. Therefore, true measures of services provided should take into account available facilities as well as nurses (figure VIII-6). As of March 1988, the number of employed nurses in each State varied widely, from 441 per 100,000 population in Louisiana to 1,166 in Massachusetts and 1,653 in the District of Columbia. The nurse/population ratios tend to be highest in the Northeast and lowest in the South. The national average was 668 employed registered nurses per 100,000 population in 1988.

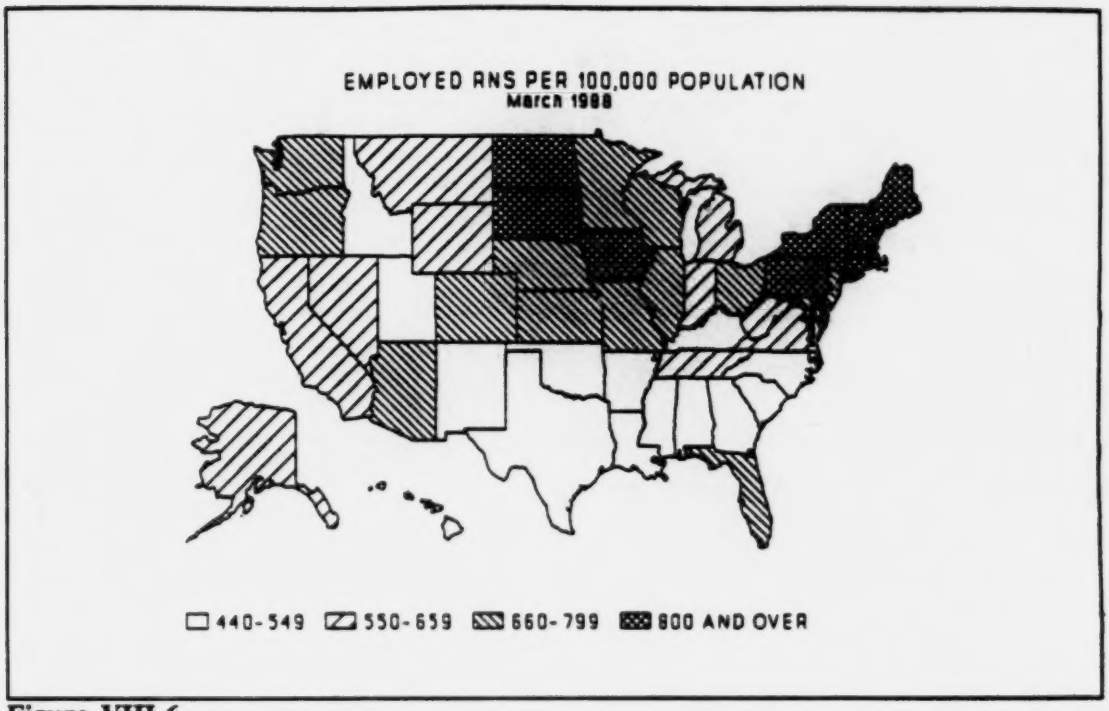

Figure VIII-6

While all States have shown increases in numbers of nurses employed, the relative size of increases from 1977 to 1988 varies widely. In general, there is less growth in the northeastern region than in other regions. States in the South show the highest growth rates.

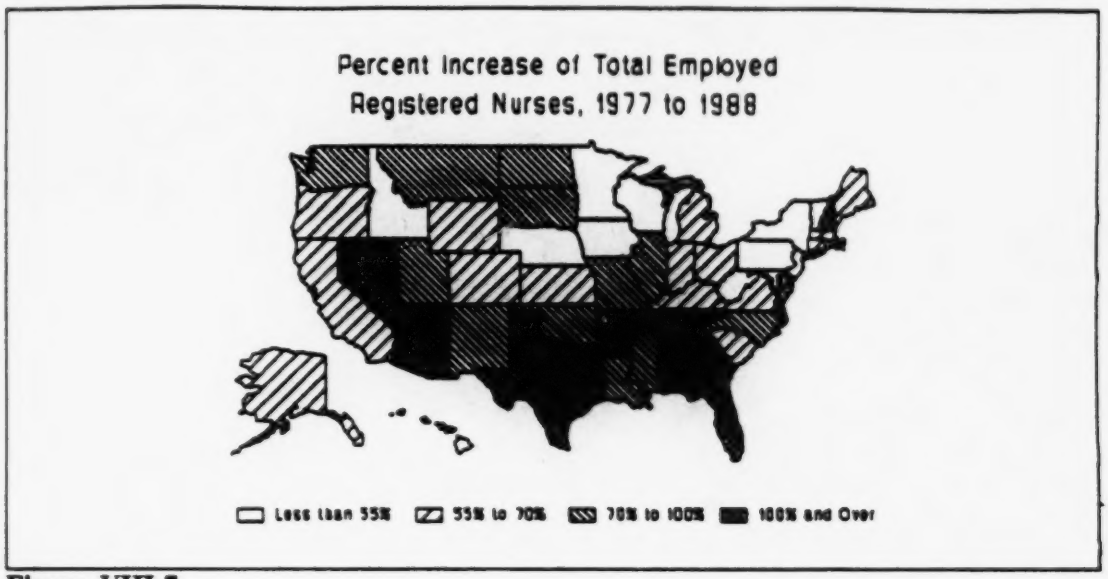

Figure VIII-7

As would be expected, most registered nurses are located in metropolitan areas. In 1988 as in 1984, 18 percent were in nonmetropolitan areas. Nurses in metropolitan areas were somewhat more likely to be employed in nursing than those in nonmetropolitan areas. About 282,000 out of the 1.6 million employed nurses work in nonmetropolitan areas.

Distribution of Nursing Personnel Within the Health Care System

Nursing personnel are the largest group within the health care system. Among the three types of personnel incorporated within the broad category of nursing, registered nurses are the largest group. Registered nurses serve in leadership roles, providing administration, supervision, and teaching, as well as direct patient care throughout the health care system. Licensed practical/vocational nurses provide direct patient care under supervision. Ancillary nursing personnel work as assistants to nurses.

Nursing personnel are found in all areas of health care, although they are predominantly institutionally based. About 68 percent of the 1.6 million employed registered nurses worked in hospitals according to the 1988 sample survey (figure VIII-8). Although there are no recent data on licensed practical/vocational nurses that provide an overall perspective on their distribution within the various employment settings, they work primarily in institutional settings as do most ancillary personnel. As home health services grow, larger numbers will work in that area.

Employment Settings

Hospitals. Although the number of hospitals and their patient populations decreased between 1982 and 1987, the number of registered nurses employed in these facilities increased as the skill level of nursing personnel increased (figure VIII-9). According to data from the American Hospital Association's annual survey of hospitals, the total number of employed nursing personnel decreased 7 percent between 1982 and 1987, while the number of employed registered nurses increased 3 percent. The largest change occurred for licensed practical/vocational nurses, whose number decreased 25 percent in the past 5 years.

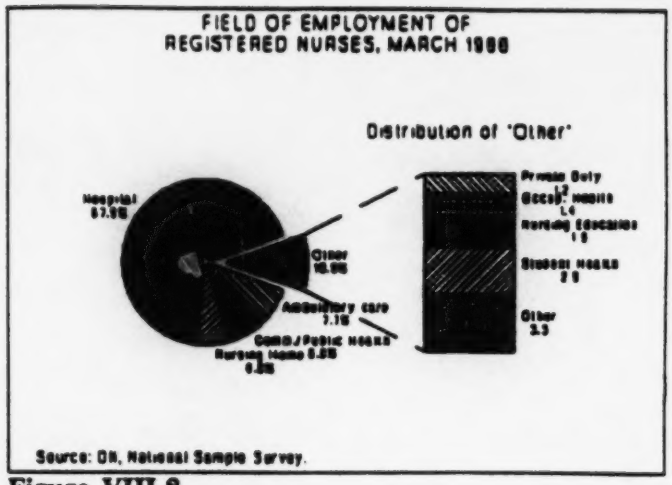

Figure VIII-8

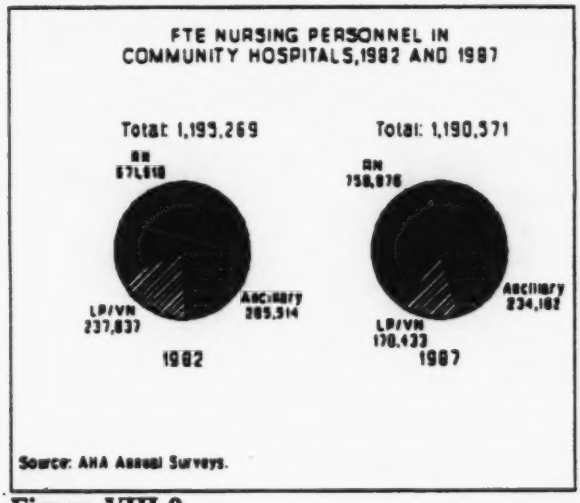

Figure VIII-9

Community hospitals (non-Federal short-term, general and special) employ most of the personnel in hospitals. The data in figure VIII-9 on full-time equivalent (FTE) nursing personnel illustrate the dramatic change in the mix of nursing personnel in these hospitals. The ratio of FTE registered nurses per 100 adjusted patient census rose from 77 in 1982 to 98 in 1987. It is important to note, however, that these ratios include all registered nurses in the hospital, those in supervisory and administrative positions as well as staff level nurses on all shifts. They do not solely represent direct patient care.

Despite increases in the number of registered nurses employed, hospitals report serious shortages of this group. The American Hospital Association's Division of Nursing found a mean vacancy rate of 11.31 percent in a survey of hospitals in December 1987 (AHA, 1987b). It also found that over 60 percent of hospitals were using overtime of registered nurses on a weekly basis to help meet staffing needs. Preliminary data from the AHA's 1988 nursing personnel surveys showed a slight decline in the vacancy rate to 10.6 percent in December (AHA, 1989). However, in another study carried out by the AHA in 1988, hospitals reported that the most serious personnel shortage was among registered nurses.

Recognizing that the reported nursing shortage appeared to be based on increased demand for registered nurses rather than a decrease in available supply, a number of studies were made in hospitals to attempt to explain what might be causing the "nursing shortage." A study by the National Center for Health Services Research and Health Care Technology Assessment, made at the request of the Secretary's Commission on Nursing, related location and hospital structure, nursing salaries and staff mix, and casemix and financial aspects to measures of shortage, including hospital perceived shortages, budgeted vacancy rates and RN-to-patient ratios (DHHS, 1988c). The study found little to explain differences between hospitals with high or low vacancy rates.

The Division of Nursing also reviewed data on the utilization of services from the American Hospital Association's nursing studies to analyze changes occurring in community hospitals between 1982 and 1986 in nursing and nonnursing health professional personnel in an attempt to explain variations in shortages among hospitals. Again, none were found.

A third study was undertaken by Project Hope for the Health Care Financing Administration in response to the Department's interest in investigating the relationship between the Medicare Prospective Payment System (PPS) and the nursing shortage (Project Hope, 1989). That study, which used the hospital as the unit of analysis, was limited to hospitals within the Standard Metropolitan Statistical Areas for which wage data on nursing personnel was available from Bureau of Labor Statistics' studies in 1981 and 1985. The dependent variables were nursing FTEs per beds, adjusted patient days and admissions. Explanatory variables encompassed nurse wages, hospital characteristics, market area characteristics, and time. The dates reflected pre- and post-PPS periods. The conclusion was that PPS is not the sole or predominant cause of increased demand for registered nurses.

The study concluded that registered nurse wages have a significant effect on hospitals' use of RNs, but also found that licensed practical nurse and aide wages rose at the same rate as RN wages so that the relative wage structure did not change appreciably during the period. The study further concluded that increased casemix complexity contributed to the increased hospital demand for registered nurses, although it was not responsible for all increased utilization. The previously mentioned NCSHR study found that although diagnostic casemix severity increased for all hospitals, it was not related to shortages.

None of these studies could draw conclusions outlining definitively the reasons for a demand for registered nurses that exceeded supply. All three studies suggest that factors that might be stronger determinants were not adequately measured. The limitations in the data available, noted in each of the studies, might be significant in identification of these factors. And, more intensive study of the influences appear to be warranted.

Nursing Homes and Extended Care Facilities. Unlike hospitals where the registered nurse is the most common type of nursing personnel, ancillary nursing personnel predominate in nursing homes and extended care facilities. Although the latest information on the distribution of personnel in nursing homes is from the 1985 National Nursing Home Survey conducted by the National Center for Health Statistics, it is probable that ancillary nursing

personnel are still the dominant type of nursing personnel. In 1985 it was estimated that there were 704,300 full-time-equivalent nursing personnel employed in nursing homes, 71 percent of whom were nursing aides or orderlies; 17 percent, licensed practical/vocational nurses, and 12 percent, registered nurses (DHHS, 1989).

Data from the 1988 sample survey support the conclusion that there has been little change in the employment of registered nurses in these facilities. The estimated number of registered nurses employed in nursing homes and related care facilities actually declined between the November 1984 and March 1988 surveys, from 115,100 to 107,800. Because a large proportion of registered nurses in nursing homes work part time, on a full-time equivalent basis, the counts were 91,600 and 88,500, respectively. Nursing homes, however, may have been able to increase their skilled nursing personnel through increased employment of licensed practical nurses because of the substantial decrease in employment of practical nurses in hospitals, making them more available for employment elsewhere.

The composition of the nursing staff available to care for residents of nursing homes has been a subject of concern. In the Institute of Medicine study, Increasing the Quality of Care in Nursing Homes it was pointed out that to provide high quality care to residents, assessment and care planning is required, both taking professional skill and judgment (IOM, 1986). In the Omnibus Budget Reconciliation Act of 1987, Congress stipulated requirements for staff coverage in nursing homes by registered nurses. These staffing levels would place requirements for the employment of registered nurses above the level that many nursing homes now maintain. It has been estimated by the HCFA and other Federal agencies that the additional number of RNs required as a result of this legislation would number about 6,000.

Home Health Care. With the decrease in length of stay in hospitals and the trend toward noninstitutional care, it is expected that home health care will become an increasingly important care setting. According to the sample surveys of registered nurses, the number of registered nurses employed by nonhospital-based home health care agencies increased 17 percent between November 1984 and March 1988, from an estimated 40,300 to 47,100. In addition, the 1988 survey estimated that there were 6,640 nurses providing home health care from hospital-based units.

Since the only data available on the number of home health care visits made is from the Health Care Financing Administration in connection with Medicare services, an analysis of number of registered nurses employed in relation to number and types of clients served cannot be made. However, it is of note that the increase in the number employed has occurred at the same time as there has been a decrease in the number of Medicare home health care visits. In 1984, those visits totalled 40,337,000 in contrast to 36,088,000 in 1987. Although neither can be tested with the available data, two possible causes of this seemingly contrary finding might be an increase in the number of non-Medicare visits and an increase in complexity of care requiring longer visits by registered nurses. Recently, Medicare limited reimbursement for home health care, undoubtedly causing a decline in the number of Medicare funded visits. Those disapproved visits may have, in part, been fulfilled through non-Medicaid means.

Lack of comprehensive data on home health care agencies precludes a detailed analysis of the total nursing personnel staff in these agencies. However, data from the Health Care Financing Administration on Medicare-certified home health care agencies as of May 1988 indicates that registered nurses are the predominant type of nursing personnel, followed by home health aides. Practical nurses were a relatively small proportion of the nursing personnel. About two-thirds of the 109,000 full-time-equivalent employees reported by HCFA were nursing personnel. Fifty-six percent of FTE nursing personnel were registered nurses; 39 percent, home health aides, and 6 percent, licensed practical/vocational nurses.

Other Areas. In addition to the changes noted above that affect the distribution of registered nurses throughout the health care system, others might be cited since they appear to reflect changes in the distribution of care settings. For these areas, too, no data are available for use in examining total nursing personnel employed and the relationship to the clients served.

One area that has shown relatively high growth is ambulatory care settings. The number of nurses employed in these settings increased 29 percent between the 1984 and 1988 sample surveys, from an estimated 97,400 to 125,800. This increase occurred in selected areas: group practice physician offices, free standing clinics, ambulatory surgical centers, and health maintenance organizations. The 27,000 nurses employed in free standing clinics and centers were more than double the number estimated in 1984. Although health maintenance organizations and group practice offices employed very small numbers of nurses, increases from 1984 to 1988 were relatively large, 55 percent and 44 percent, respectively. In 1988 an estimated 12,700 registered nurses were employed by health maintenance organizations and 27,400 by physicians in group practices. There was little change in nurse employment in traditional public health settings. Employment in State, city, county and other official health agencies was estimated at 39,500 in 1988 and 38,700 in 1984.

Selected Areas of Practice of Registered Nurses

A little over two-thirds of employed registered nurses are in staff-level positions and about 12 percent are in middle management positions as head nurses or supervisors. Almost 1 out of 5 are found in specialized practice, teaching or administrative positions (figure VIII-10). Although these positions usually require advanced education, some nurses qualified for them through experience and continuing education.

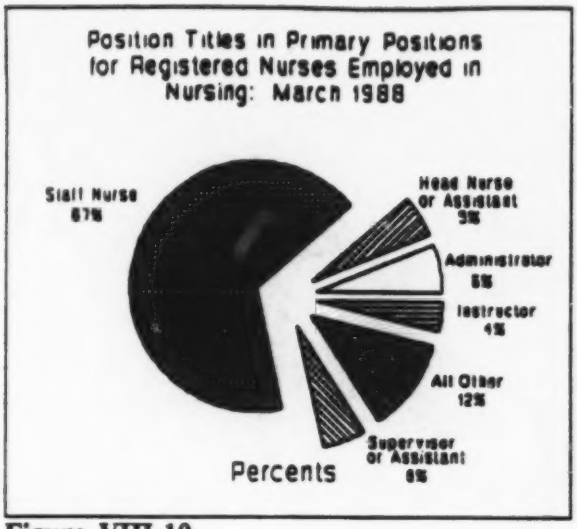
Position Titles in Primary Positions for Registered Nurses Employed in Nursing: March 1988
Staff Nurse 67%
Head Nurse or Assistant 9%
Administrator 6%
Instructor 4%
All Other 12%
Supervisor or Assistant 8%
Percents

Figure VIII-10

Nurse Practitioners/Nurse Midwives. Of the 63,000 registered nurses who, according to the 1988 survey data, had formal nurse practitioner/nurse midwifery training, about 88 percent were employed in nursing. However, while over one-third have titles of nurse practitioner or nurse midwife, a large proportion fill a variety of positions, ranging from administrative to staff positions. Since the study did not include questions on the functions within the nurse's position, the extent to which and how the skills acquired in the training program are put to use in these positions cannot be determined. Nurses whose nursing practice positions carried the title of nurse practitioner or nurse midwife are a small proportion of employed registered nurses. Only 1.5 percent of the total, they number an estimated 23,535, including those with no formal training as nurse practitioners. Only 27 percent of nurse practitioners are employed in hospitals. About one-third are employed in ambulatory care settings and almost 30 percent are in community or public health settings. Five percent are self-employed.

Clinical Nursing Specialists and Nurse Clinicians. Clinical nurse specialists and nurse clinicians, experts in a specific area of clinical nursing practice, are a relatively small percentage of the registered nurse supply. In March 1988 there were an estimated 28,975 clinical nurse specialists (1.8 percent) and 17,628 nurse clinicians (1.1 percent). The major employment setting is the hospital (68 percent), although about 15 percent were employed in ambulatory care settings, 11 percent, in public health/community health, and 3 percent were self-employed. Although it is generally expected that these nurses would have master's degrees, the majority do not at this time. Thirty-four percent of clinical nursing specialists and 11.5 percent of nurse clinicians have master's degree preparation.

Nurse Administrators. In addition to nurses in positions requiring advanced, specialized, clinical skills, those in key management positions have responsibility for policy development, fiscal affairs, allocation of resources, strategic planning, and professional practice within the nursing department of a health care setting. In March 1988 there were an estimated 98,400 nurses with administrative position titles; 89,495 of whom were in top administrative positions in settings in which health care services are provided to the public, 5.5 percent of all employed registered nurses. These positions are found in a wide range of settings including relatively small health units providing a narrow range of services and large, complex, institutional or public or community health services.

The extent to which nurse administrators are engaged in the full array of management functions depends on the organizational structure of the setting and the complexity of the nursing services provided. The Secretary's Commission on Nursing pointed to the importance of recognizing the registered nurse's decision-making ability in order to promote nursing as a career and to improve patient care delivery. The Commission made specific recommendations pertaining to the inclusion of nurses in policy-making areas within the health care delivery organization. Nurses in key management positions in institutional, community-based, and corporate nursing services increasingly require business and fiscal preparation along with the professional practice base. Graduate education to prepare nurse administrators are geared to meet these requirements. At the present time, however, only about 20 percent of the 98,400 nurses with administrative position titles have at least a master's degree and only about 29 percent have a baccalaureate degree.

Nurse Educators. Faculty members in nursing educational programs and those who provide in-service and continu : education are vital to the assurance of a well-qualified nurse supply. In March 1988 .iere were an estimated 30,000 registered nurses employed in positions in formal nursing education programs and an additional 20,300 who had position titles of in-service director or instructor in service settings.

About half of those employed by nursing education programs are in baccalaureate or higher degree programs, 28 percent are in associate degree programs, 13 percent in practical nursing programs, and about 10 percent in diploma programs. There have been significant improvements over the years in the level of educational preparation of faculty in schools of nursing. In March 1988 almost three-quarters of the 30,000 nurses in these programs had at least a master's degree with 11 percent having doctorates. In November 1984, 62 percent had at least a master's degree and 9 percent, a doctorate.

Nurse Researchers. Although perhaps the smallest of the specialized nursing areas, nursing research is vital to the foundation of professional practice. The doctoral degree is generally the acceptable credential for research capability. As indicated earlier, an estimated 4,300 employed registered nurses had doctoral degrees in March 1988. Eighty percent were in administrative or teach g positions within nursing educational programs and 14 percent were employed in hos. .tals. Nursing research is primarily carried out under the aegis of educational programs and some faculty within those programs combine research with teaching students.

Of nurses with titles as researchers (estimated to number about 4,800 in March 1988), over 60 percent are employed in hospitals. Since over three-quarters of these nurses have less than a master's degree, it may be assumed that their primary responsibilities involve carrying out established research protocols rather than designing and initiating research projects.

Rates of Compensation

Current concerns about the shortage of registered nurses and potential nursing students have focused attention on the compensation provided to nurses. The Secretary's Commission on Nursing devoted a large part of its deliberations to questions of comparability and adequacy of salaries paid to registered nurses at entrance into nursing and over the total nursing career. Both aspects are seen as having an effect on recruitment and retention.

Beginning Salary Levels. In early 1988 the National League for Nursing surveyed registered nurses who received their first license to practice in the latter part of 1987. Over 9 of 10 of employed nurses in the study worked in hospitals. The average annual salary of the newly licensed nurse, employed on a full-time basis, was $22,582 (table VIII-7). Variation in average annual salaries for graduates from different types of programs was minimal, ranging from $22,201 for associate degree graduates to $23,161 for baccalaureate graduates. Diploma graduates average $22,383. Differences noted here, however, could be due to variation in salaries among geographic areas and types of employment settings.

Table VIII-7

AVERAGE ANNUAL SALARY FOR NEWLY LICENSED NURSES EMPLOYED ON A FULL-TIME BASIS, BY REGION: JULY 1987

REGION	AV. ANN. SALARY
UNITED STATES	$22,582
NEW ENGLAND	$24,675
MIDDLE ATLANTIC	$24,139
SOUTH ATLANTIC	$22,050
EAST SOUTH CENTRAL	$20,806
WEST SOUTH CENTRAL	$22,161
EAST NOTH CENTRAL	$22,127
WEST NORTH CENTRAL	$20,255
MOUNTAIN	$21,248
PACIFIC	$24,818

SOURCE: NATIONAL LEAGUE FOR NURSING. UNPUBLISHED DATA.

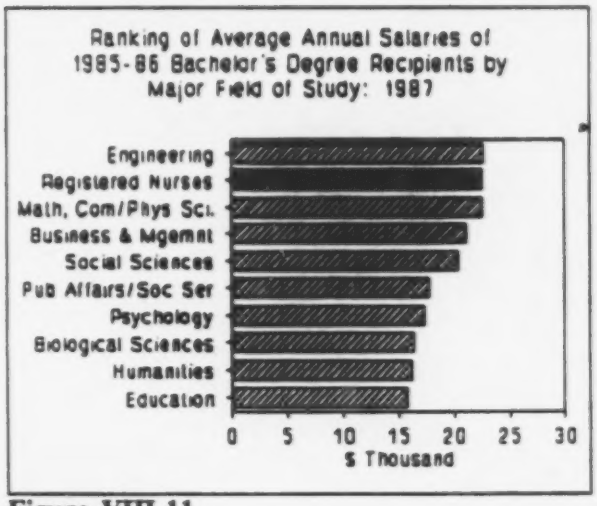

Figure VIII-11

The study of 1985-86 baccalaureate graduates carried out in April 1987 by the National Center for Educational Statistics provides some insight into salary comparability between registered nurses and graduates with other types of educational majors (DOE, 1987). In that study, the average annual salary of a newly registered nurse, who was a baccalaureate graduate employed on a full-time basis, was $22,478. As can be seen in figure VIII-11, this salary ranked high among the different fields of study.

Salary Levels for All Registered Nurses. While entrance level salaries seem to be on a par with salaries provided to other new entrants into professional positions, data from the sample survey show a lack of significant progression as nurses continue in their careers. The average annual salary of all registered nurses employed on a full-time basis in March 1988 was $28,383. The average salary of staff nurses was $26,263. Those in administrative positions earned $34,564, a difference of $8,300, or 32 percent more than the average for a staff nurse.

Nurses employed in staff nurse positions in occupational health settings and in hospitals have the highest average annual salaries for staff level positions, $27,389 and $27,196, respectively (figure VIII-12). Staff nurses in ambulatory care settings have the lowest salaries, $21,528, followed by staff nurses in nursing homes and other extended care facilities, $22,381. The average salary of staff nurses in nursing homes show the largest increase between November 1984 and March 1988, 23 percent. The average salary of hospital staff nurses increased 21 percent. School health nurses and public health/community health nurses' average salaries showed the smallest increases.

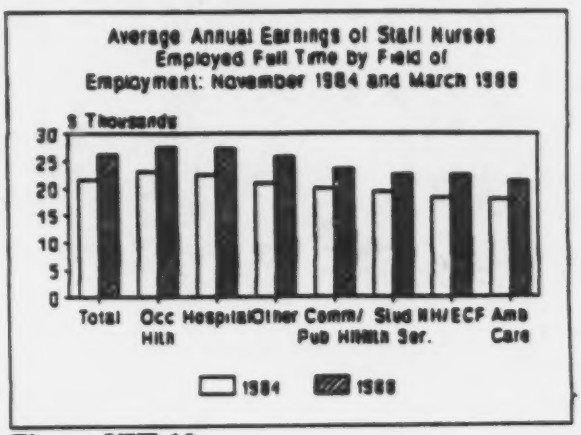

Figure VIII-12

The Outlook for the Future

Since the Second Report to the Congress (March 1979) a similar set of models has been used to derive projections of supply of and requirements for nursing personnel. Although model structures and the broad objectives of models have been consistent, the base data and assumptions upon which conclusions have been based in each report have been updated to reflect new information and the latest trends.

For this report, the March 1988 survey of registered nurses provided up-to-date information on numbers and characteristics of the registered nurse population and allowed for refinement of trends in personal and professional characteristics and employment. In addition, particular attention has been given to the issue of nursing shortages by incorporating such factors as evidences of demand in hospitals and new legal requirements for nurses in nursing homes.

Supply of Registered Nurses

The model to project supply of registered nurses (those employed in nursing) tracks the flow of cohorts of nurses from the time of graduation (or first entry into licensure). By examining age and education specific cohorts within each State, and changes resulting from migrations, educational upgrades, dynamics of movement in and out of the workforce and in and out of licensure, the model develops data on registered nurse licensees.

New Graduates. New graduates from basic nursing education programs, once they obtain licenses to practice, are the major source for new entrants into the registered nurse population (table VIII-8). Present projections of graduations are based essentially on the same assumptions as in the last report, with adjustments for actual graduations from 1985 through 1987, the actual number being lower than that anticipated for those years. Assuming no fundamental changes in the educational system preparing for registered nurse licensure, the projections took account of statistical trends in numbers of students in each type of program. The accelerated decline in number of diploma programs was assumed to continue, but some programs would remain throughout the projection period. The basis for the State-by-State statistical regression analysis used for projections for associate and baccalaureate degree graduates included historical data on number of these students, number of women first-time enrollments in institutions of higher education, and number of 17-44 year-old women in the population.

Table VIII-8

PROJECTED NUMBER OF GRADUATES FROM BASIC NURSING PROGRAMS PREPARING REGISTERED NURSES, BY TYPE OF PROGRAM: ACADEMIC YEARS 1990 THROUGH 2020

ACADEMIC YEAR	TOTAL	ASSOCIATE DEGREE	DIPLOMA	BACCALAUREATE
1990	61,700	39,600	5,000	17,100
1995	71,000	44,600	5,300	21,100
2000	66,600	42,600	4,200	19,800
2005	60,700	40,100	3,300	17,300
2010	57,700	38,000	2,600	16,400
2015	54,600	36,600	2,000	16,000
2020	53,200	35,800	1,600	15,800

SOURCE: DN PROJECTIONS

The projections took into account the most recent increase in admissions, assuming that declines in admissions had "bottomed out" and that numbers would return to 1986 levels by 1991. Estimates of graduations were based on appropriate lags in admissions and data on completion rates. Lower admission levels cause graduations to continue downward until 1990. Graduations then increase until the mid-1990s to a high of about 71,500, then gradually decrease throughout the remainder of the projection period as the size of the population groups from which students could be drawn decreases.

Since all new graduates need to achieve licensure status to be registered nurses, a further constraint on new additions to the registered nurse population in the early years of the projection period was the decline in license passage rates in 1988. Eighty-five percent of first-time examination takers passed compared to 91 percent the previous year. Retakers also had a lower passage rate than previously. It was assumed that rates would rise to pre-1988 levels by 1992.

Added Education. Projections were also made of the number of registered nurses who pursued additional education after licensure so that population and supply projections reflect changing educational distribution patterns. Projecting the number of registered nurses obtaining a baccalaureate degree after licensure took into account trends in number of post-RN baccalaureate graduates and the pool of associate degree and diploma registered nurses from which these could be drawn.

Projections of master's degree graduates were maintained at the level used in the last report, which took account of the increasing number of students and the increasingly higher numbers of part-time students. The fact that numbers of graduates from baccalaureate programs have recently leveled off made it logical not to increase the output from master's degree programs. However, there appears to be an adequate number of baccalaureates to maintain the prior master's degree projections.

Net Losses from the Registered Nurse Population. New entrants into the registered nurse population are a relatively small part of the total number of nurses in any one year. The nurse population largely consists of those who have entered nursing over a period of years and have continued their licensure. No data are available on nurses who fail to renew their licenses to practice or who become relicensed after giving up all active licenses. However, by examination of trends from succeeding sample surveys, it is possible to derive "net losses" from the registered nurse population. Examination of the most recent data for each nurse age group led to assumptions of major changes in the net loss distribution.

Activity Rates. Because not all licensed nurses are engaged in nursing, to determine the supply, that is, those nurses available for employment, activity rates are developed within the model. Activity rates, which measure the propensity of nurses at particular ages to be in the nurse workforce, are assumed to change over time from initial rates (1988 national sample survey of registered nurses) to continue the trends observed to date. The activity rates for the registered nurse population have been increasing, particularly the middle-year age groups, so that further increases in these rates are projected. Furthermore, except for older age groups, activity rates at each age level are now fairly high. In view of this, the model does not include assumptions about influences that might induce a larger proportion of registered nurses to work.

Projections of Registered Nurses to 2020. The size of the RN population is a function of number of new licensees (and therefore new graduates) who have entered the profession and the number of registered nurses who failed to maintain their license for whatever reason (net loss) or have died (mortality). As long as the total loss (net loss plus mortality) is less than the new licensees, the RN population will continue to grow. When these numbers come into balance, the RN population will remain constant, and when the total loss exceeds the number of new licensees, the RN population will decline. As shown in figure VIII-13, the projected decrease of new licensees and increase in net loss cause the total loss and new licensee input to balance in 2009, each reaching a value of approximately 60,000, at which time the RN population attains its maximum value of 2,534,600 licensees. As the total loss exceeds the new licensees over the remainder of the projection period, the RN population declines to 2,313,600 licensees in 2020 (table VIII-9).

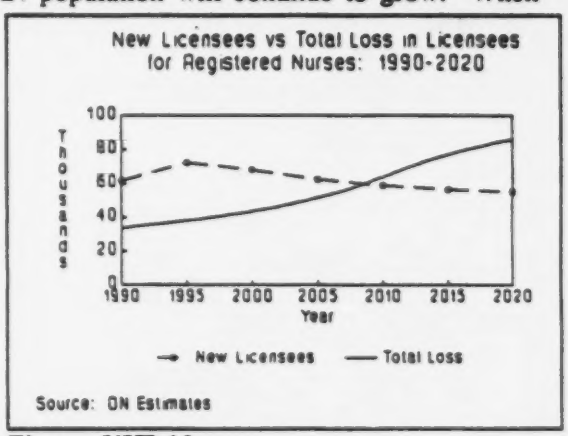

Figure VIII-13

Table VIII-9

REGISTERED NURSE POPULATION, SUPPLY, AND FTE SUPPLY: 1990-2020

AS OF DECEMBER 31	REGISTERED NURSE POPULATION	REGISTERED NURSE SUPPLY	FTE SUPPLY
1990	2,118,900	1,687,100	1,414,800
1995	2,288,300	1,813,300	1,528,900
2000	2,431,400	1,912,600	1,623,600
2005	2,518,900	1,947,600	1,659,000
2010	2,531,200	1,900,100	1,621,600
2015	2,455,300	1,780,400	1,519,800
2020	2,313,600	1,642,900	1,403,600

FTE=FULL-TIME EQUIVALENT

SOURCE: DN PROJECTIONS

The registered nurse supply reaches a maximum of 1,947,600 approximately 4 years prior (2005) to the time the population reaches its maximum. The full-time-equivalent supply also peaks in 2005 at 1,659,000. Peaking of supply before the population peaks is caused by different activity rates of each age group (table VIII-10) and changes in age distribution over the projection period.

Table VIII-10

ACTIVITY RATE OF REGISTERED NURSES BY AGE GROUP, AND PERCENT OF POPULATION OVER 50: 1990-2020

AGE GROUP	1990	1995	2000	2005	2010	2015	2020
ALL RNS	79.6	79.2	78.7	77.3	75.1	72.5	71.1
20-24	97.8	97.9	97.9	97.9	97.9	97.9	97.8
25-29	92.0	92.1	92.1	92.1	92.1	92.1	92.1
30-34	87.3	87.3	87.5	87.7	87.9	88.0	88.2
35-39	86.5	86.7	87.2	87.7	88.0	88.4	88.7
40-44	85.1	85.3	85.5	85.8	86.0	86.3	86.5
45-49	83.2	83.6	83.9	84.4	84.6	84.9	85.2
50-54	78.9	79.1	79.6	79.9	80.3	80.6	80.7
55-59	69.7	70.0	70.3	70.5	70.8	70.9	71.3
60-64	49.8	48.3	47.8	46.9	45.6	44.6	43.8
65-69	25.6	25.1	24.8	24.9	23.9	23.7	23.6
70-74	14.4	14.8	15.1	13.3	12.7	12.1	11.7
PERCENT OF POP. OVER 50	26.8	29.2	35.1	44.1	50.7	53.4	52.7

SOURCE: DN PROJECTIONS

Combination of activity rates for each age group and aging of the registered nurse population results in the aggregate activity rate declining from the current 80 percent to 71.1 percent by 2020. After 2005, the increase shown in the RN population between that year and 2009 no longer offsets the decreasing aggregate activity rate. Table VIII-11 shows the effects of the projection of RN supply in relation to the country's population to be served. The supply of RNs per 100,000 population increases through 2000, when it reaches a maximum of 713 and then declines to 558 by 2020.

Table VIII-11

PROJECTIONS OF TOTAL REGISTERED NURSE SUPPLY AND FULL-TIME EQUIVALENT SUPPLY RATIOS:1990-2020

YEAR	TOTAL RNs PER 100,000 POPULATION	FTE RNs PER 100,000 POPULATION
1990	674	565
1995	697	588
1000	713	605
2005	707	602
2010	672	574
2015	616	526
2020	558	477

SOURCE: DN PROJECTIONS

Educational Distribution of Registered Nurses. The levels of highest educational preparation of RNs projected to be in the nurse supply change for a number of reasons.

The number of RNs with an associate degree or diploma as highest level of preparation declines from 1990 to 2020 (table VIII-12). The number of diploma program trained nurses continues to decline because of aging of the nurse population (more older nurses trained in these programs) and the near disappearance of diploma education programs. Associate degree programs are projected to remain as the dominant source of new graduates, but their numbers can only offset a fraction of the diploma loss.

Associate/diploma highest educational preparational level declines from 1,027,700 in 1990 to 698,400 in 2020, from 62.2 percent to 43.4 percent of the total supply. Registered nurses with a baccalaureate degree as highest level of preparation

Table VIII-12

HIGHEST EDUCATIONAL PREPARATION OF REGISTERED NURSE SUPPLY: 1990-2020

YEAR	TOTAL	A.D. & DIPLOMA	BACCA-LAUREATE	MASTER'S & DOCTORATE
1990	1,687,100	1,027,700	535,500	124,000
1995	1,813,300	1,028,200	624,600	160,400
2000	1,912,600	1,011,000	695,600	206,100
2005	1,947,600	965,100	734,600	247,900
2010	1,900,100	885,600	733,900	280,600
2015	1,780,400	784,100	693,800	302,500
2020	1,642,900	698,400	627,000	317,500

SOURCE: DN PROJECTIONS

increase slightly from 535,500 in 1990 to 627,000 in 2020, from 30.5 percent to 37.8 percent of the total supply. Nurses with a master's or doctorate as highest level of preparation rises from 124,000 in 1990 to 317,500 in 2020, from 7.3 percent to 18.8 percent of the total supply. This level shows the largest numerical increase from 1990 to 2020 (193,500) as well as the largest percentage gain (156 percent).

Distribution of Registered Nurses Within States. As seen in table VIII-9, the Nations' RN supply is expected to decrease 2.6 percent between 1990 and 2020. However, the behavior of the State supply during the same period varies considerably depending on education projections and the initial educational-age distribution of the nurse population within a particular State. Caution should be used in interpreting State projections, particularly those with relatively small nurse populations, because of small sample sizes that may cause estimates to differ noticeably from the true value of the population attribute measured. Changes in registered nurse supply in many States is not unlike that of the national trend - 14 States changed 5 percent or less over the entire projection period (figure VIII-14).

The nurse supply in nine States increased from 6 percent to 20 percent from 1990 to 2020, while 13 States decreased from 6 percent to 20 percent. Eight States increased more than 20 percent (the greatest increase was 78 percent), and seven States decreased more than 20 percent (the greatest decrease being 54 percent). The majority of States, like the Nation, attain maximum supply levels after year 2000 and then decline. The projected supply of registered nurses in each State in the year 2000 can be seen in table VIII-A-4. The full-time equivalent supply is in table VIII-A-5.

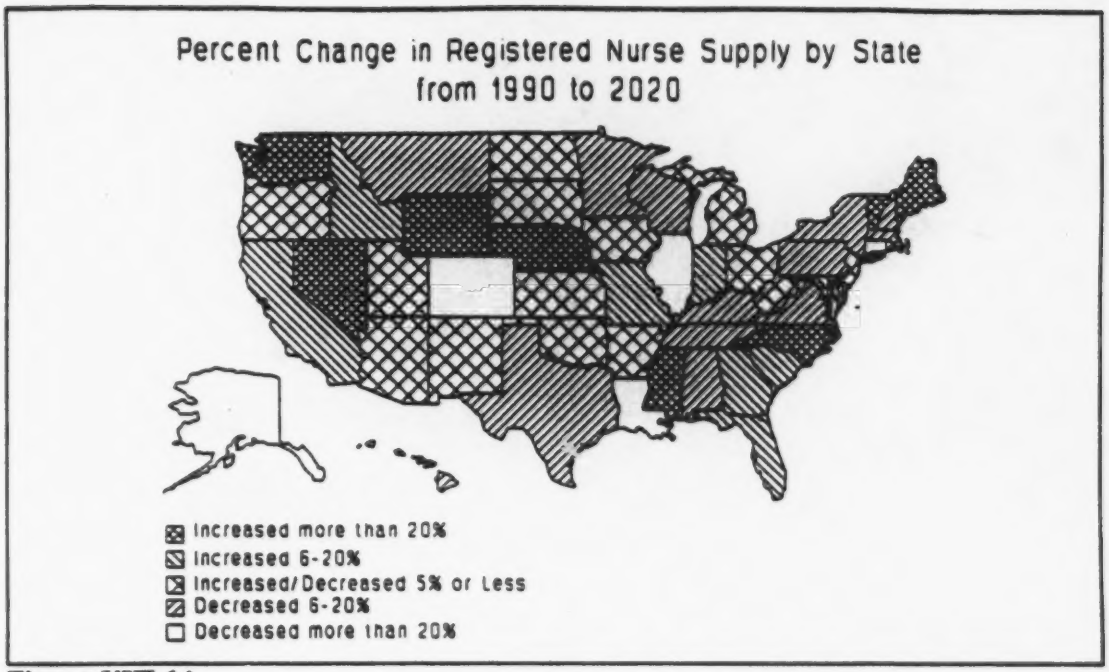
Percent Change in Registered Nurse Supply by State
from 1990 to 2020
Increased more than 20%
Increased 6-20%
Increased/Decreased 5% or Less
Decreased 6-20%
Decreased more than 20%

Figure VIII-14

Requirements for Nursing Personnel

Examination of requirements for nursing personnel in the future can be made from a variety of perspectives. Two approaches have been used for this report. The historical trend-based model generates future requirements as a function of past and current trends of provided services and nursing utilization, as modified by assumptions about how the health care system may change in the future. The criteria-based model is based on professional judgment and assumed the attainment of major health care and nursing goals in determining future requirements.

In addition to the results of these models, this section reports briefly on one other set of projections covering nursing personnel. The Bureau of Labor Statistics develops projections of the United States economy that provide employment projections for various occupational groups. Included are the nursing personnel occupational groups.

Underlying Assumptions About Health Care Services. Development of projections of requirements for nursing personnel depend upon future health services needed and supplied and utilization of nursing personnel in providing those services. A number of underlying assumptions about the future population and health services required were used in the projections for the historical-trend based and the criteria-based models.

Changes in components of the U.S. population were based directly on projections of the population of States and United States by the Bureau of the Census (total population increase over the projection period is 21 percent). The general thrust of projections of provided services reflected a case management scenario including a substantial growth of HMO and PPO membership (to approximately 48 percent of the total population in 2020). Additionally, for the entire projection period the following increases in provided services are estimated: visits to all types of physicians offices, 41 percent, community hospital inpatient days, 17 percent, outpatient visits, 11 percent, nursing home days, 22 percent, and home health visits, 66 percent. The trend projected for all physician offices consists of two major components, HMO and PPO visits and visits to traditional (fee-for-service) offices. The latter grows sharply in the early part of the projection period followed by a moderated growth rate to 2020. Traditional office visits grow initially, but decline as HMO and PPO components expand; thus, total projected number of physician office visits gradually declines.

The Historical Trend-Based Model

The model considers requirements for registered nurses on the basis of major categories of health care providers employing registered nurses: community hospitals, all other hospitals, nursing homes, community health, physician offices (including HMOs and PPOs along with traditional office based settings), nursing education, and other miscellaneous settings as a group. There are three major categories of trends considered: components of the

population, provided services, and utilization of full-time equivalent nurses per provided services. Since no current estimates of licensed practical/vocational nurse utilization were available, it was not possible to make projections of LP/VN requirements.

The model itself, as its name indicates, is predicated on the assumption that historical trends will determine future behavior of the health care system. The validity of this assumption is affected by the extent to which the introduction of forces or events change the behavior pattern of the system. Another assumption was that RN utilization per provider service would not fall below current levels. Cost containment efforts by government, the private sector, and the health care industry place constraints on growth of nursing home beds, a slowing growth of RN hours per patient day in community hospitals, and, as noted above, encourage growth in HMO and PPO enrollment.

There are two major sectors of the health care system that were subjected to additional assumptions about RN utilization. The total number of FTE RNs employed in hospitals included those employed by a temporary or contract service as well as those on the hospital payroll. This increased the total number 2 percent. Additionally, the December 1987 Hospital Nursing Personnel Demand Survey conducted by the AHA, collected data on overtime hours worked by RNs in respondent hospitals (AHA 1987b). These data reveal that number of overtime hours worked annually is equivalent to approximately 5 percent of total FTE RNs employed in hospitals. Therefore, RN utilization rates in community hospitals were increased to reflect this actual level of RN employment. The combination of temporary/contract RNs and amount of estimated overtime hours worked by RNs amounts to 7 percent more FTE RNs utilized in community hospitals than would be the case if only those on the payrolls of hospitals were included in the utilization rate.

Legislation contained in the Omnibus Budget Reconciliation Act of 1987 specifies levels of RN employment in certified nursing homes that are greater than many of these homes currently employ. Because the estimates indicate that these homes will need to employ an additional 6,000 RNs to meet legislative requirements, the utilization rate for RNs in this setting was conservatively increased by 6 percent according to estimates contained in Chapter II of Volume II in the Secretary Commission on Nursing Report (DHHS, 1988c).

Registered Nurse Requirements. Using the assumptions outlined above, the projection of registered nurse requirements generated by the historical trend-based model shows an increase of 41.1 percent in FTE RN requirements for the 1990 to 2020 period (table VIII-13).

This is an increase of 664,300 FTE RNs over the 30 year projection period. The hospital area increases by 291,800 FTE RNs or 26.3 percent while nursing homes increase 59,000, 57.4 percent. The latter increase largely reflects an increase in RN utilization over the projection period since the number of resident days increases only by 22 percent. The nursing education area shows the smallest absolute and relative increase: 3,900 and 17.2

Table VIII-13

PROJECTED REQUIREMENTS FOR FULL-TIME EQUIVALENT REGISTERED NURSES
FROM THE HISTORICAL TREND-BASED MODEL, BY AREA OF PRACTICE: 1990-2020

AREA OF PRACTICE	YEAR 1990	1995	2000	2005	2010	2015	2020
TOTAL	1,614,200	1,811,000	1,967,000	2,071,000	2,142,400	2,209,500	2,278,500
HOSPITAL	1,110,100	1,225,600	1,307,300	1,358,300	1,373,500	1,387,900	1,401,900
PHYSICIAN'S OFFICE	143,400	174,600	203,000	210,200	217,000	217,400	215,200
NURSING HOME	102,800	116,400	129,900	141,400	150,800	156,100	161,800
COMMUNITY/PUBLIC HEALTH	170,500	196,400	222,200	250,500	284,000	323,800	367,700
NURSING EDUCATION	22,900	27,800	28,100	27,400	26,900	26,700	26,800
OTHER	64,600	70,200	76,500	83,200	90,200	97,600	105,100

SOURCE: DN PROJECTIONS

percent. The number of FTE RN educators required is very sensitive to enrollment levels in each educational program. Enrollment numbers can be gauged by numbers of graduations, which peak in the 1995-2000 period and then decline until 2020 (table VIII). Therefore, enrollment levels can be expected to follow a similar course, peaking early in the projection period and then declining. Nurse educators required, following the same pattern, reach a maximum in the 1995-2000 period and decline, but remain above 1990 levels.

The community health area consists of four subareas: school nursing (in primary, secondary and post-secondary settings), occupational health, home health, and other community settings. All show growth in FTE RN requirements, particularly the home health area. By 2020 the overall requirements in this area increase by 197,200 or 115.7 percent. Physician offices have a total increase of 71,800 or 50.1 percent, which represents the requirements for HMO and PPO settings and traditional fee-for-service settings. RN utilization in HMOs is somewhat less per visit than in traditional fee-for- service settings. Since traditional setting visits reach a peak in the middle of the projection period and HMO-PPO visits increase throughout the period, RN requirements will reach a peak toward the end of the projection period and then fall somewhat by 2020.

The "other" practice area includes registered nurses who work as private duty nurses, self-employed nurses, and those not fitting into any other employment category. Generally, the number of private duty nurses will remain fairly constant in the future, while those who are self-employed or employed in settings (as nurses) not included in the practice areas identified will continue to rise in the future, ultimately increasing by 40,500 or 62.7 percent.

State Registered Nurse Requirements. The cautions stated earlier concerning the variability of State level data and projections also pertain to the requirements area. State projections of requirements for nurses follow the same pattern shown by the national projections with 18 States increasing from 40 to 50 percent over 1990 levels (figure VIII-15).

Eight States show increases of at least 30 percent but less than 40 percent, while only seven States increase less than 30 percent, the lowest increase being 17 percent. Ten States increase more than 50 percent, but less than 70 percent, eight States increase 70 percent or more, and the largest increase is 101 percent. The States also follow the national trend during the projection period in that State requirements continue to increase from 1990 to 2020. The projected requirements for each State one in table VIII-A-6.

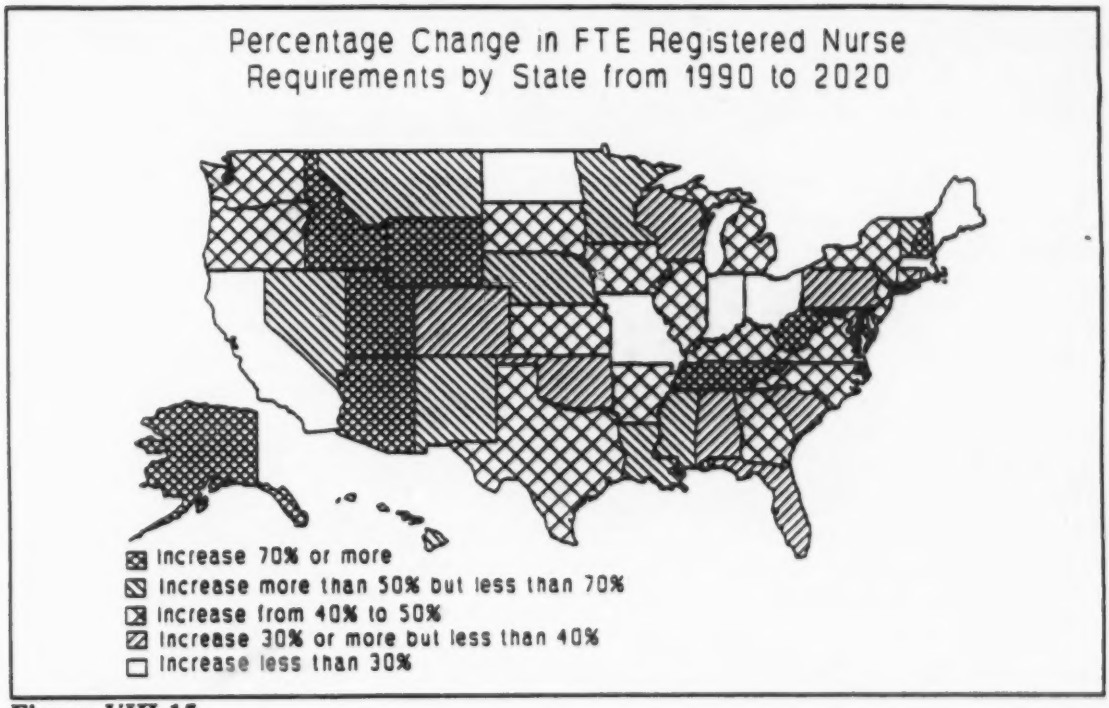
Percentage Change in FTE Registered Nurse Requirements by State from 1990 to 2020
Increase 70% or more
Increase more than 50% but less than 70%
Increase from 40% to 50%
Increase 30% or more but less than 40%
Increase less than 30%

Figure VIII-15

The Criteria-Based Model

An entirely different approach to projecting requirements is taken by the criteria-based model, which generates future requirements for nurses by estimating needs on the basis of goals reflecting appropriate maintenance or restoration of a population's health care status and quality of care. This approach, in contrast to a model focusing on historical trends, relies heavily on professional judgement for assumptions and estimates regarding optimum

nursing care needs, ideal staffing requirements, desirable educational mix of personnel, and other key considerations. Its results, consequently, similar to other professional judgement approaches, are often reflective of the diversity and experience of the specific panelists involved in the modeling exercise.

Nothwithstanding such caveats, however, this modeling approach does provide another helpful, comparative perspective for forecasting purposes. It is within this analytic context that the model is described here and its latest interaction presented. As noted elsewhere in this report, work is presently underway within the Division of Nursing to expand the methodologies for projecting nursing requirements, specifically undertaking developmental work regarding demand projections. It is anticipated that the 8th Report on the Status of Health Personnel in the United States will provide preliminary results from that effort.

The criteria-based model uses a detailed framework of practice areas that includes all segments of the health care system employing nurses. The estimated needs for each practice area also specify the mix of types of nursing resources (RNs, LP/VNs, ancillaries) and the projected numbers of RNs by level of education for each practice area specified by the framework.

This method, initially developed in 1977, was reviewed and updated in 1980, 1984, and 1987, and most recently in 1989. The model relies on a panel of experts to identify health care goals and nurse utilization rates, using an iterative process for all nursing utilization specifications. An attempt is made to select experts who possess varied backgrounds of experience and knowledge on many aspects of nursing and the health care system. The panel convened in 1989 consisted of representatives from all levels of nursing practice and education and included clinical nurse specialists, nurse practitioners, certified nurse midwives, and administrators of nursing services. In addition, two physicians, an economist, and representatives from 16 organizations attended. The Panel was divided into three groups for discussion purposes: institutionally-based; non-institutionally based, and advanced practice.

Deliberations of the panel captured the changes occurring in nursing practice and reexamined those levels of services where current levels seemed less than adequate. The process also included discussion of adequacy and appropriateness of certain segments of the model itself.

A basic premise of the criteria-based model is that nurse utilization levels should be specified that represent two distinct health care objectives. First, utilization levels that some States might consider attainable and could therefore work to achieve (specified as the lower bound) and, second, specification of levels that States could use largely as a framework to guide their use of nursing resources (specified as the upper bound). An assumption of universal access to care is a critical aspect of this modeling process.

The panel also assumed that changes would continue in the health care system. Hospital services would continue to change since inpatients would have higher acuity levels, and more surgery would be performed in ambulatory settings. The trend towards prospective payment systems (PPS) would continue and would be applied in other health care settings. This would include continued expansion of HMO and PPO enrollments: approximately 50 percent of the population would be enrolled in one of the organizations by the year 2000, according to the panel. Another major assumption of the panel was that the decline in utilization of licensed practical/vocational nurses would continue, and that by 2000, these nurses would be employed only in institutional settings (hospitals and nursing homes). An assumption was made by the panel that by 2010, all nurses would have at least associate degree preparation. The panel also assumed that the roles of clinical nurse specialists and nurse practitioners would merge and that the distinction between the two would essentially disappear. The number of nurse practitioner certificate programs has fallen dramatically and the ANA goal is that by 1992 all nurse practitioners will be prepared in master's programs that will end differences in educational preparation. The panel assumed that in the future there would be only two types of basic nursing preparation, the baccalaureate (four-year program) and the associate degree (two-year program).

Projections of Nurse Requirements. The projected levels of nurse requirements for 2000 obtained through the process outlined above indicate that under the lower bound assumptions, a total of 2,102,000 FTE RNs will be required - an increase of 738,000 over the number employed in 1988, an increase of 54 percent (table VIII-14). State projected requirements from the criteria-based model are found in tables VIII-A-7 and 8.

Table VIII-14

PROJECTED REQUIREMENTS* FOR FULL-TIME EQUIVALENT NURSING PERSONNEL FROM THE CRITERIA-BASED MODEL, BY AREA OF PRACTICE: FOR 2000

AREA OF PRACTICE	LOWER BOUND RNs	LOWER BOUND LP/VNs	LOWER BOUND AIDES	UPPER BOUND RNs	UPPER BOUND LP/VNs	UPPER BOUND AIDES
TOTAL	2,102,000	345,500	1,395,700	2,657,800	343,000	1,685,200
HOSPITAL	1,253,800	66,800	255,700	1,582,400	38,300	237,700
NURSING HOME	291,300	278,700	839,000	340,400	304,700	891,900
NURSING EDUCATION	41,400	0	0	52,600	0	0
COMMUNITY/ PUBLIC HEALTH	236,200	0	226,200	251,700	0	424,700
AMBULATORY CARE	268,800	0	74,800	417,500	0	130,900
OTHER	10,800	0	0	13,200	0	0

* PRELIMINARY DATA

SOURCE: DN PROJECTIONS

Hospitals are projected to require 324,000 more FTE RNs (not counting the additional number of FTE RNs gained through increased overtime) than were employed in 1988, an increase of 35 percent. However, the more striking result is the increase of 203,000 FTE RNs that will be needed in the nursing home area -

nearly two and one-half times the number employed in 1988. This increase is due to the panel's conclusion that nursing home residents will fall into three categories of care: functionally dependent with complex needs, functionally dependent but stable, and functionally assisted. The first category of resident requires the greatest amount of nursing care. Estimated at 5 percent of the current resident population, this category will likely double by 2000. The second category requires a lesser amount of nursing care and comprises the bulk of nursing residents at present and in 2000. The increasing acuity of the typical nursing home resident combined with a RN utilization rate higher than currently available produce a future FTE RN requirement that is much larger than the number of FTE RNs employed in nursing homes today.

The community health/public health area also calls for substantial increases, 81,000 FTE RNs or 52 percent more than the current employment level, in response to the panel's considerations of a number of unmet needs such as those in the maternal child health area. Ambulatory care also shows a considerable increase in requirements.

In addition to considering nurse utilization by function and type of setting, the panel distinguished among levels of educational preparation required of registered nurses to carry out needed functions in the most effective way. In 1989, as in prior years, definitions were based on what the panel judged to be needed. Given the current educational distribution of registered nurses, the criteria established can only be considered as goals, as shown in the subsequent section comparing the projections of requirements with the supply projections.

Projected Employment of Nursing Personnel. The Bureau of Labor Statistics develops projections of the U.S. economy including projections of future employment in various occupations. Included are registered nurses, licensed practical nurses, and nursing aides. The occupational classifications followed by BLS are different from those used to define nursing in this report and are reflected in BLS data. For some industries, nursing personnel employed may not be identified separately. However, conclusions drawn in these projections are of interest to a general discussion of future nursing requirements.

Based on moderate level projections for the year 2000 that BLS released in 1987, they saw an increase of about 612,000 positions between 1986 and 2000 for registered nurses, a 44 percent increase. BLS saw the demand for registered nurses to be particularly strong in hospitals because cost containment pressures will have nurses assuming some duties of other health personnel. Rapid growth in employment of registered nurses in physicians' offices was also predicted due to increases in the size of physician practices and more sophisticated medical technology. It was also expected that there would be rapid growth in registered nurse positions in nursing homes.

Projections for employment of licensed practical nurse also reflected substantial growth, about 238,000 positions between 1986 and 2000, a 38 percent increase. BLS estimated that many of the licensed practical nurses would be employed in nursing homes, which

would grow in response to an aging population. Employment of nursing aides would also grow by 33 percent, an increase of about 361,000 jobs between 1986 and 2000. Home health aides was seen as one of the fastest growing categories with an 80 percent increase in number of positions between 1986 and 2000.

A Comparative Review of Projections for the Future

Given the sensitivity of each model to a large number of assumptions, the 6.2 percent difference in the overall projections for the year 2000 between the historical trend-based and the lower bound criteria-based model indicates good agreement (table VIII-15).

In specific areas of nursing practice, however, some significant differences are noted. The nursing home area shows a large difference in projections, undoubtedly a result of the panel's consideration of the shift in level of care needs that require a significant nursing response. This same applies to the ambulatory care area where the criteria-based projection is noticeably larger than that of the historical trend-based model. Of interest in this connection is that the BLS pointed to the nursing home and physician office area as having rapid growth in employment of RNs.

Table VIII-15

COMPARISON OF FTE RN REQUIREMENTS FROM THE HISTORICAL TREND-BASED MODEL AND CRITERIA-BASED MODEL: FOR 2000

AREA OF PRACTICE	HISTORICAL TREND-BASED	CRITERIA-BASED LOWER BOUND	CRITERIA-BASED UPPER BOUND
TOTAL	1,967,000	2,102,000	2,657,800
HOSPITAL	1,307,300	1,253,800	1,582,400
NURSING HOME	129,900	291,300	340,400
NURSING EDUCATION	28,100	41,400	52,600
COMMUNITY/ PUBLIC HEALTH	222,200	236,200	251,700
AMBULATORY CARE	203,000	268,800	417,500
OTHER	76,500	10,500	13,200

FTE=FULL-TIME EQUIVALENT

SOURCE: DN PROJECTIONS

Throughout the projection period, the requirements for FTE RNs, as estimated by the historical trend-based model, exceed the supply (figure VIII-16). Initially, this occurs because of the specific assumptions regarding accounting for overtime hours worked in hospitals and legislation affecting nursing homes (see previously discussed specific assumptions in the Historical Trend-Based Model).

The difference between the projections continues to widen throughout the projection period as requirements continue to increase. The requirements increase by nearly 50,000 per year immediately after 1990, slowing to somewhat over 20,000 per year by 2020. For reasons noted earlier, the supply, while initially increasing somewhat over 20,000 per year immediately after 1990, will reach a peak at 2005 when there is no increase and, finally, will fall by more than 20,000 per year at 2020 when it will be just under its 1990 level.

The highest educational preparation of the required FTE RNs as projected by the criteria-based model and the FTE RN supply estimated to be attained show considerable divergence (figure VIII-17). According to the lower bound projected requirements, about 692,000 FTE RNs with educational preparation at associate degree/diploma level would be required compared with an estimated supply of 848,000. However, for baccalaureate prepared FTE RNs, the situation is reversed: 1,019,000 required and 591,000 in the supply.

Similarly, about 392,000 masters' and doctoral prepared FTE RNs would be required with supply estimated at 185,000.

An important assumption underlying the deliberations of the panel was that the baccalaureate level of preparation would become the minimum standard for professional practice, and that there would be significantly greater need for nurses with specialized preparation at the master's level and above. As pointed out earlier, the panel recognized that their criteria with respect to the required educational mix of nurses could only be considered as goals. Given the current and anticipated trends in educational levels, these could be difficult to achieve.

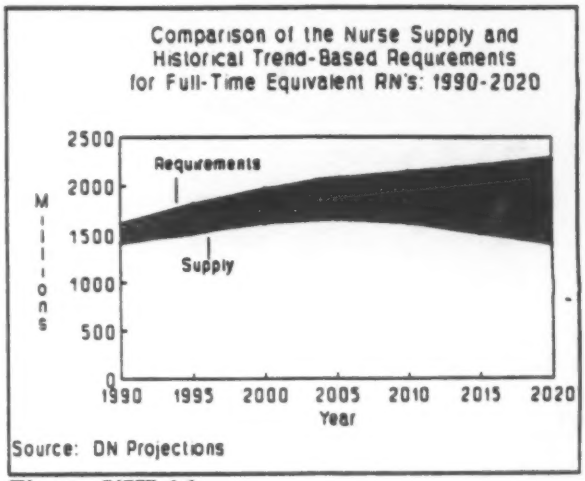

Figure VIII-16

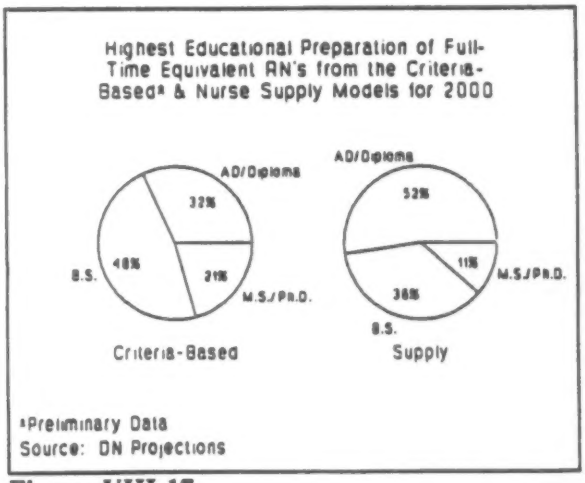

Figure VIII-17

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Conclusions and Recommendations

Data from the March 1988 National Sample Survey of Registered Nurses document the increasing supply of registered nurses projected in prior reports. At the same time the data indicated a number of factors that show little change or improvement. The racial/ethnic composition of registered nurses has not changed. Despite the increase in the overall supply of registered nurses, the number from racial/ethnic minority backgrounds remained the same from November 1984 to March 1988. Although all States have had an increase in their nurse supply over the 10-year span of sample surveys and the southern area had relatively larger increases than other areas, its nurse to population ratio was still well below the other areas.

After several years of decline, admissions and enrollments in educational programs preparing for registered nurse practice increased in 1988, although graduations decreased reflecting the substantial declines in admissions in the previous three years. Furthermore, admissions levels in 1988 were still substantially below those of the early 1980s.

The 1988 sample survey disclosed an increasing age level of the registered nurse population. Assuming no major shifts in current trends, although it is anticipated that graduation levels will improve through the mid-1990s, the combined effects of fewer new graduates and the older ages at which students are graduating from nursing educational programs lead to continuing significant increases of age level of the overall nurse population. The previous Report to Congress on Nursing indicated that these trends will lead to a decline in nurse supply within the next 15 or so years and continuing declines thereafter. Recent data show that these trends are even more pronounced. Based on current information, the registered nurse supply in 2020, in relation to the population forecast for that time, would be 558 per 100,000 persons in contrast to 713 in 2000 and 668 in March 1988. On the other hand, when the changing population and current trends in nursing and health services utilization are taken into account, requirements for RNs are projected to increase.

An area which has shown improvement over the years is the educational attainment of registered nurses. Significantly more registered nurses are prepared at the baccalaureate and graduate levels today than a decade ago. When current trends in nursing education are taken into account it is expected that the number of baccalaureate and graduate level degree nurses will continue to increase. However, the March 1988 survey shows that a substantial proportion of registered nurses in leadership positions still do not have educational levels considered appropriate for the positions. As the needs for such personnel increase, the gap will continue between available supply of nurses with baccalaureates and advanced degrees and anticipated requirements.

The Secretary's Commission on Nursing, established to examine the nursing situation and to recommend actions, completed its work in December 1988 (DHHS, 1988c). The

Commission's recommendations included steps for both public and private sectors. While the Commission was concerned with current indications of nursing shortages, the solutions proposed looked toward future changes. Recommendations included measures to examine and ensure appropriate utilization of nursing resources as well as steps to increase the attraction of nursing as a career.

The Department of Health and Human Services has approved a plan developed by the Public Health Service to implement recommendations of the Commission. The plan, as described in chapter IV-C, coordinates PHS activities underway in areas such as research, financial assistance and program development within available resources. It establishes new initiatives through reexamination, priority setting, and targeting, and includes liaison activities with the private sector and other public entities for reducing nursing shortages.

The need for continued analysis to assess availability of nursing resources and the health system's requirements for these services is also evident. The importance of developing appropriate data bases for monitoring nursing resources was stressed by the Commission. The Bureau of Health Professions has obtained valuable information from a group of knowledgable experts on the extent of data available, the most appropriate sources and approaches, and study priorities to fill gaps.

The data in this Seventh Report to Congress also underscore the need to address the nursing educational system from different aspects. Consideration has to be given to development of approaches to attract nursing students from a broader population base. Also, concerted efforts are needed to ensure that available nursing education opportunities are appropriate to the changing needs of society and the preparation of nurses able to provide expert care and leadership.

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Table VIII-A-1. Admissions to and Graduations from Nursing Educational Programs Preparing Registered Nurses, by Type of Program and Geographic Area, 1987-1988

Geographic area	Admissions				Graduations			
	Total	Baccalaureate[1]	Associate Degree	Diploma	Total	Baccalaureate[1]	Associate Degree	Diploma
United States	94,594	28,732	57,473	8,389	64,915	21,542	37,435	5,938
New England	5,203	1,717	2,874	612	3,904	1,609	1,768	527
Connecticut	1,200	516	457	227	733	286	282	165
Maine	421	226	195	0	288	166	122	0
Massachusetts	2,545	715	1,482	348	2,029	796	942	291
New Hampshire	422	81	341	0	305	97	179	29
Rhode Island	402	104	261	37	404	193	169	42
Vermont	213	75	138	0	145	71	74	0
Middle Atlantic	18,116	4,483	10,511	3,122	12,280	3,821	6,261	2,198
New Jersey	3,009	681	1,459	869	1,731	382	847	502
New York	9,349	2,184	6,743	422	6,090	1,762	4,002	326
Pennsylvania	5,758	1,618	2,309	1,831	4,459	1,677	1,412	1,370
South Atlantic	15,178	4,023	10,254	901	10,131	3,045	6,556	530
Delaware	370	117	236	17	278	137	133	8
District of Columbia	449	359	90	0	246	191	55	0
Florida	3,651	652	2,920	79	2,715	521	2,143	51
Georgia	2,075	561	1,420	94	1,236	415	745	76
Maryland	1,449	388	927	134	1,026	345	609	72
North Carolina	2,881	553	2,150	178	1,722	508	1,126	88
South Carolina	1,239	355	884	0	846	309	537	0
Virginia	2,149	753	1,077	319	1,459	476	799	184
West Virginia	915	285	550	80	603	143	409	51
East South Central	8,170	2,763	4,958	449	4,860	1,657	2,974	229
Alabama	2,003	834	1,136	33	1,430	568	842	20
Kentucky	1,879	607	1,272	0	1,148	365	783	0
Mississippi	1,440	322	1,118	0	851	309	542	0
Tennessee	2,848	1,000	1,432	416	1,431	415	807	209
West South Central	9,830	3,356	5,788	686	5,641	2,049	3,213	379
Arkansas	1,306	310	684	312	670	200	380	90
Louisiana	1,558	911	412	235	999	490	328	181
Oklahoma	1,335	407	928	0	786	254	532	0
Texas	5,631	1,728	3,764	139	3,186	1,105	1,973	108
East North Central	16,886	5,531	9,709	1,596	12,727	4,534	6,890	1,303
Illinois	3,840	1,162	2,418	260	2,974	984	1,712	278
Indiana	2,496	1,116	1,263	117	1,755	774	845	136
Michigan	3,521	1,069	2,298	154	2,763	850	1,755	158
Ohio	4,960	1,219	2,705	1,036	3,753	1,198	1,868	687
Wisconsin	2,069	965	1,025	29	1,482	728	710	44
West North Central	7,761	2,736	4,208	807	5,345	1,896	2,844	605
Iowa	1,668	377	1,124	167	1,135	322	699	114
Kansas	1,165	403	723	29	843	291	519	33
Minnesota	1,570	445	1,125	0	1,125	415	710	0
Missouri	1,962	601	860	501	1,397	352	666	379
Nebraska	663	538	71	54	288	185	41	62
North Dakota	191	191	0	0	179	179	0	0
South Dakota	542	181	305	56	378	152	209	17
Mountain	4,200	1,305	2,895	0	2,906	918	1,988	0
Arizona	970	270	700	0	767	247	520	0
Colorado	873	299	574	0	552	210	342	0
Idaho	391	78	313	0	228	26	202	0
Montana	322	220	102	0	203	144	59	0
Nevada	268	71	197	0	182	35	147	0
New Mexico	731	77	654	0	385	71	314	0
Utah	450	231	219	0	454	162	292	0
Wyoming	195	59	136	0	135	23	112	0
Pacific	9,250	2,818	6,266	166	7,121	2,013	4,941	167
Alaska	166	126	40	0	46	26	20	0
California	6,320	1,720	4,434	166	4,969	1,283	3,519	167
Hawaii	345	170	175	0	202	90	112	0
Oregon	875	288	587	0	755	248	507	0
Washington	1,544	514	1,030	0	1,149	366	783	0

1/ Includes students in a few generic programs leading to a master's or doctoral degree.

SOURCE: National League for Nursing. Unpublished data.

Table VIII-A-2. Admissions to and Graduations from Practical Nursing Educational Programs by Geographic Area: 1986-1987

Geographic Area	Admissions[1]	Graduations[1]	Geographic Area	Admissions[1]	Graduations[1]
United States	42,452	27,285			
New England	1,385	1,108	East North Central	5,660	4,011
Connecticut	335	257	Illinois	1,728	1,030
Maine	179	152	Indiana	932	669
Massachusetts	758	541	Michigan	1,163	955
New Hampshire	62	56	Ohio	1,640	1,215
Rhode Island	0	45	Wisconsin	197	142
Vermont	51	57			
			West North Central	4,485	2,608
Middle Atlantic	6,146	3,994	Iowa	1,007	489
New Jersey	1,278	814	Kansas	646	469
New York	2,950	1,844	Minnesota	1,213	718
Pennsylvania	1,918	1,336	Missouri	995	644
			Nebraska	369	227
South Atlantic	7,256	4,258	North Dakota	235	44
Delaware	99	44	South Dakota	20	17
District of Columbia	159	61			
Florida	2,212	1,374	Mountain	1,832	1,270
Georgia	1,581	883	Arizona	380	316
Maryland	261	175	Colorado	466	269
North Carolina	569	329	Idaho	107	90
South Carolina	544	321	Montana	180	100
Virginia	1,350	751	Nevada	56	43
West Virginia	481	320	New Mexico	242	152
			Utah	289	233
East South Central	3,841	2,452	Wyoming	112	67
Alabama	1,304	783			
Kentucky	895	596	Pacific	4,907	3,319
Mississippi	617	418	Alaska	0	0
Tennessee	1,025	655	California	3,372	2,207
			Hawaii	109	63
West South Central	6,940	4,274	Oregon	310	265
Arkansas	755	625	Washington	1,116	784
Louisiana	1,383	763			
Oklahoma	689	489			
Texas	4,113	2,397			

1/ Time period for academic year is August 1 through July 31.

SOURCE: National League for Nursing. Nursing Data Review, 1988.

Table VIII-A-3. Registered Nurse Population and Full-Time Equivalent Employed Registered Nurses by Geographic Area, March 1988

Geographic Area	Number in Sample	Total	Employed in Nursing Number	Employed in Nursing Percent	Not Employed in Nursing Number	Not Employed in Nursing Percent	RNs per 100,000 pop.[1]	FTE Registered Nurses	FTE RNs 100,000 pop.[1]
UNITED STATES	33,047	2,033,032	1,627,035	80.0	405,997	20.0	668	1,363,600	560
NEW ENGLAND	3,332	170,080	130,915	77.0	39,166	23.0	1,020	102,449	798
CONNECTICUT	526	39,550	29,367	74.3	10,183	25.7	916	23,072	719
MAINE	622	12,318	9,639	78.3	2,679	21.7	809	7,753	653
MASSACHUSETTS	789	87,694	68,255	77.8	19,439	22.2	1,167	53,173	908
NEW HAMPSHIRE	467	13,525	10,015	74.0	3,510	26.0	946	7,909	748
RHODE ISLAND	545	11,156	9,149	82.0	2,008	18.0	933	7,081	718
VERMONT	383	5,837	4,490	76.9	1,347	23.1	821	3,461	632
MIDDLE ATLANTIC	3,259	383,590	293,961	76.6	89,629	23.4	785	247,697	662
NEW JERSEY	613	73,321	53,239	72.6	20,082	27.4	693	43,526	567
NEW YORK	1,408	178,912	142,899	79.9	36,013	20.1	802	121,936	684
PENNSYLVANIA	1,238	131,357	97,823	74.5	33,534	25.5	819	82,235	689
SOUTH ATLANTIC	5,707	329,779	259,671	78.7	70,108	21.3	623	224,521	539
DELAWARE	403	6,860	5,661	82.5	1,199	17.5	885	4,665	724
DISTRICT OF COLUMBIA	349	10,928	10,279	94.1	649	5.9	1,656	9,042	1,454
FLORIDA	999	102,470	80,319	78.4	22,151	21.6	668	70,019	582
GEORGIA	725	41,873	33,860	80.9	8,012	19.1	545	29,414	473
MARYLAND	756	41,182	32,207	78.2	8,975	21.8	710	26,152	577
NORTH CAROLINA	646	47,647	37,568	78.8	10,080	21.2	586	33,879	528
SOUTH CAROLINA	638	19,249	15,180	78.9	4,069	21.1	444	13,651	399
VIRGINIA	682	45,865	33,500	73.0	12,365	27.0	567	28,012	474
WEST VIRGINIA	509	13,705	11,097	81.0	2,608	19.0	585	9,687	511
EAST SOUTH CENTRAL	2,363	97,925	82,644	84.4	15,281	15.6	540	73,585	481
ALABAMA	650	26,763	22,113	82.6	4,650	17.4	541	19,791	485
KENTUCKY	599	23,279	19,495	83.7	3,784	16.3	523	17,418	467
MISSISSIPPI	553	14,252	12,147	85.2	2,104	14.8	461	11,118	424
TENNESSEE	561	33,631	28,889	85.9	4,743	14.1	595	25,258	520
WEST SOUTH CENTRAL	2,641	157,744	125,470	79.5	32,275	20.5	466	113,243	421
ARKANSAS	492	14,394	11,292	78.4	3,102	21.6	473	9,966	417
LOUISIANA	556	23,625	19,685	83.3	3,941	16.7	442	18,115	406
OKLAHOMA	643	18,851	15,036	79.8	3,815	20.2	458	13,596	416
TEXAS	950	100,874	79,457	78.8	21,417	21.2	474	71,566	426
EAST NORTH CENTRAL	3,531	365,890	295,202	80.7	70,688	19.3	705	242,011	578
ILLINOIS	878	104,697	84,779	81.0	19,918	19.0	734	69,616	601
INDIANA	580	43,203	35,527	82.2	7,675	17.8	642	30,207	546
MICHIGAN	611	79,330	60,463	76.2	18,867	23.8	658	49,164	534
OHIO	937	97,258	80,095	82.4	17,163	17.6	743	66,075	613
WISCONSIN	525	41,402	34,338	82.9	7,065	17.1	714	26,949	561
WEST NORTH CENTRAL	4,327	159,622	135,464	84.9	24,157	15.1	768	111,096	630
IOWA	803	27,472	22,770	82.9	4,702	17.1	805	18,347	647
KANSAS	706	20,247	16,863	33.3	3,384	16.7	683	14,432	583
MINNESOTA	729	40,116	33,911	84.5	6,204	15.5	798	25,904	610
MISSOURI	598	45,102	38,277	84.9	6,825	15.1	751	33,113	649
NEBRASKA	605	13,536	11,627	85.9	1,909	14.1	728	9,475	594
NORTH DAKOTA	424	6,752	6,239	92.4	513	7.6	923	4,950	737
SOUTH DAKOTA	462	6,397	5,777	90.3	620	9.7	818	4,875	688
MOUNTAIN	4,195	101,036	81,838	81.0	19,200	19.0	623	68,581	521
ARIZONA	721	29,860	23,191	77.7	6,669	22.3	685	19,989	590
COLORADO	772	28,917	23,459	81.1	5,458	18.9	713	19,448	590
IDAHO	474	6,329	4,963	78.4	1,366	21.6	501	4,071	408
MONTANA	460	6,748	5,275	78.2	1,473	21.8	655	4,189	508
NEVADA	398	7,677	6,367	82.9	1,310	17.1	636	5,678	564
NEW MEXICO	466	9,180	7,489	81.6	1,691	18.4	500	6,230	415
UTAH	538	9,294	8,397	90.3	898.0	9.7	500	6,691	398
WYOMING	366	3,031	2,697	89.0	335	11.0	551	2,285	466
PACIFIC	3,692	267,362	221,869	82.9	45,495	17.1	607	179,617	492
ALASKA	340	4,243	3,351	79.0	892	21.0	648	2,815	536
CALIFORNIA	1,596	191,947	159,008	82.8	32,940	17.2	575	128,999	466
HAWAII	427	7,024	5,923	84.3	1,102	15.7	545	5,187	479
OREGON	600	23,477	20,466	87.2	3,011	12.8	753	16,155	593
WASHINGTON	729	40,671	33,121	81.4	7,550	18.6	729	26,461	583

Estimated number and percent may not add to total because of rounding.

1/ Population data used for RN population ratios are from U.S. Bureau of the Census, CURRENT POPULATION REPORTS, Series P-25, No. 1024. Issued May 1988.

SOURCE: Division of Nursing, BHPr, HRSA, USDHHS, National Sample Survey of Registered Nurses, March 1988. Unpublished data.

Table VIII-A-4. Projected Supply of Registered Nurses by Educational Preparation and Geographic Area, December 31, 2000

Geographic area	Total RNs	Associate degree & diploma	Bacca-laureate	Master's & doctoral	RNs per 100,000 population[1]
United States	1,912,600	1,010,980	695,600	206,050	713
New England	141,200	62,170	57,200	21,720	1,025
Connecticut	25,500	10,920	11,650	2,880	740
Maine	13,700	6,940	5,980	790	1,079
Massachusetts	73,200	30,980	26,070	16,100	1,202
New Hampshire	11,000	4,350	6,040	600	824
Rhode Island	9,900	6,290	3,100	470	944
Vermont	7,900	2,690	4,360	880	1,337
Middle Atlantic	324,100	165,960	123,350	34,860	852
New Jersey	60,500	28,390	25,080	7,040	801
New York	152,100	83,080	53,630	15,400	846
Pennsylvania	111,500	54,490	44,640	12,420	969
South Atlantic	337,100	191,910	113,920	31,210	674
Delaware	7,500	3,220	3,050	1,220	1,025
District of Columbia	9,400	3,410	5,100	860	1,483
Florida	105,200	67,230	32,180	5,800	683
Georgia	46,900	27,380	15,680	3,800	589
Maryland	41,300	21,190	16,000	4,140	784
North Carolina	54,900	29,020	18,910	6,970	734
South Carolina	19,400	10,630	6,570	2,180	497
Virginia	39,700	22,190	13,450	4,050	577
West Virginia	12,800	7,640	2,980	2,190	743
East South Central	94,200	61,410	24,610	8,250	579
Alabama	26,900	15,590	8,040	3,280	610
Kentucky	18,500	12,920	4,760	840	496
Mississippi	15,000	8,720	3,900	2,430	521
Tennessee	33,800	24,180	7,910	1,700	642
West South Central	138,200	72,320	51,080	14,790	451
Arkansas	14,900	9,180	4,970	730	589
Louisiana	16,100	8,800	5,840	1,460	357
Oklahoma	15,900	7,600	6,270	2,020	471
Texas	91,300	46,740	34,000	10,580	452
East North Central	337,800	181,230	116,670	39,900	809
Illinois	85,400	44,280	29,900	11,230	737
Indiana	47,000	23,100	16,540	7,370	854
Michigan	77,340	43,260	25,380	8,710	836
Ohio	90,260	50,250	29,540	10,480	849
Wisconsin	37,800	20,340	15,310	2,110	791
West North Central	162,810	81,780	66,810	14,130	912
Iowa	26,300	15,870	9,180	1,230	1,032
Kansas	22,310	11,940	8,750	1,620	884
Minnesota	37,900	19,260	13,280	5,330	844
Missouri	45,700	21,250	21,130	3,350	848
Nebraska	17,000	7,260	8,150	1,550	1,093
North Dakota	7,100	2,800	3,800	470	1,129
South Dakota	6,500	3,400	2,520	580	912
Mountain	97,351	49,220	39,710	8,370	608
Arizona	27,300	14,460	9,380	3,450	592
Colorado	22,851	10,920	9,220	2,720	599
Idaho	6,600	3,490	2,680	420	629
Montana	5,600	3,020	2,430	90	707
Nevada	15,000	8,420	6,390	210	1,153
New Mexico	7,300	3,670	3,390	240	371
Utah	9,400	3,860	4,660	870	472
Wyoming	3,300	1,380	1,560	370	673
Pacific	280,000	144,990	102,280	32,860	645
Alaska	1,600	520	920	190	233
California	199,700	105,720	70,380	23,640	596
Hawaii	6,200	2,780	3,170	270	460
Oregon	24,300	13,800	8,780	1,720	846
Washington	48,200	22,170	19,030	7,040	965

Estimated numbers may not add to total because of rounding.

1/ Census-based projections of population by Office of Data Analysis Management, BHPr, HRSA, USDHHS, 1989.

SOURCE: Projections by Division of Nursing, BHPr, HRSA, USDHHS, 1989.

Table VIII-A-5. Projected Full-Time Equivalent Supply of Registered Nurses by Educational Preparation and Geographic Area, December 31, 2000

Geographic area	Total FTE RNs	Associate degree & diploma	Bacca-laureate	Master's & doctoral	FTE RNs per 100,000 pop.[1]
United States	1,623,600	847,740	590,710	185,170	606
New England	112,300	45,930	42,170	18,110	815
Connecticut	20,500	8,490	9,490	2,570	595
Maine	11,300	5,510	5,060	750	890
Massachusetts	57,700	23,810	20,080	13,860	948
New Hampshire	9,100	3,380	5,190	500	682
Rhode Island	7,500	4,740	2,350	430	715
Vermont	6,200				1,049
Middle Atlantic	277,200	139,660	106,500	31,040	729
New Jersey	49,000	23,160	20,610	5,260	573
New York	132,500	70,970	47,020	14,520	737
Pennsylvania	95,700	45,530	38,870	11,260	832
South Atlantic	293,670	166,550	98,780	28,390	587
Delaware	6,400	2,580	2,630	1,200	874
District of Columbia	8,400	3,020	4,580	770	1,325
Florida	92,700	59,690	27,560	5,460	601
Georgia	41,270	23,900	13,970	3,390	519
Maryland	33,500	16,520	13,380	3,630	636
North Carolina	49,800	26,130	17,440	6,250	666
South Carolina	17,300	9,550	5,890	1,860	443
Virginia	32,900	18,570	10,700	3,650	478
West Virginia	11,400	6,590	2,630	2,180	662
East South Central	84,600	55,190	21,840	7,480	520
Alabama	24,100	13,900	7,200	2,950	547
Kentucky	16,600	11,590	4,290	720	445
Mississippi	14,000	8,040	3,650	2,320	487
Tennessee	29,900	21,660	6,700	1,490	568
West South Central	126,500	65,600	46,740	14,210	413
Arkansas	13,300	8,370	4,300	660	526
Louisiana	15,000	7,930	5,600	1,450	332
Oklahoma	14,400	6,900	5,720	1,770	427
Texas	83,800	42,400	31,120	10,330	415
East North Central	281,600	148,270	98,150	35,350	675
Illinois	71,300	36,780	24,720	9,850	616
Indiana	41,200	19,560	14,790	6,880	749
Michigan	64,100	35,140	21,480	7,520	693
Ohio	75,300	40,940	25,180	9,190	708
Wisconsin	29,700	15,850	11,980	1,910	621
West North Central	134,800	66,470	55,660	12,640	755
Iowa	21,100	12,570	7,400	1,120	828
Kansas	19,100	10,380	7,280	1,440	756
Minnesota	29,000	14,430	10,090	4,460	646
Missouri	40,200	18,400	18,560	3,240	746
Nebraska	14,200	5,790	6,950	1,460	913
North Dakota	5,700	2,150	3,060	450	906
South Dakota	5,500	2,750	2,320	470	771
Mountain	83,000	41,500	33,910	7,510	518
Arizona	23,900	12,460	8,240	3,220	518
Colorado	19,200	9,030	7,860	2,300	504
Idaho	5,400	2,870	2,130	390	514
Montana	4,400	2,410	1,880	90	556
Nevada	13,500	7,510	5,770	200	1,038
New Mexico	6,200	3,030	2,890	230	315
Utah	7,600	3,020	3,790	750	382
Wyoming	2,800	1,170	1,350	330	571
Pacific	229,800	116,470	83,680	29,640	529
Alaska	1,400	430	760	190	203
California	163,700	84,980	57,530	21,210	489
Hawaii	5,500	2,470	2,750	260	408
Oregon	19,600	10,870	7,090	1,630	682
Washington	39,600	17,720	15,550	6,350	793

Estimated numbers may not add to total because of rounding.

1/ Census-based projections of population by Office of Data Analysis Management, BHPr, HRSA, USDHHS, 1989

Table VIII-A-6. Projected Requirements for for Full-Time Equivalent Registered Nurses from Historical Trend-Based Model, 2000

Geographic area	Registered nurses	Geographic area	Registered nurses
United States	1,967,000		
New England	130,060	East North Central	362,240
Connecticut	31,350	Illinois	108,820
Maine	10,440	Indiana	42,300
Massachusetts	63,920	Michigan	75,420
New Hampshire	10,270	Ohio	95,150
Rhode Island	8,740	Wisconsin	40,550
Vermont	5,340		
		West North Central	159,420
Middle Atlantic	372,090	Iowa	25,480
New Jersey	62,150	Kansas	19,620
New York	188,480	Minnesota	41,940
Pennsylvania	121,460	Missouri	46,650
		Nebraska	11,990
South Atlantic	319,610	North Dakota	6,270
Delaware	5,580	South Dakota	7,470
District of Columbia	11,770		
Florida	94,720	Mountain	99,990
Georgia	46,180	Arizona	29,930
Maryland	34,010	Colorado	25,830
North Carolina	49,500	Idaho	6,170
South Carolina	19,900	Montana	9,670
Virginia	41,430	Nevada	7,330
West Virginia	16,520	New Mexico	8,400
		Utah	8,700
East South Central	120,710	Wyoming	3,960
Alabama	29,550		
Kentucky	26,390	Pacific	231,600
Mississippi	20,790	Alaska	3,920
Tennessee	43,980	California	162,270
		Hawaii	6,670
West South Central	171,280	Oregon	23,640
Arkansas	16,130	Washington	35,100
Louisiana	29,220		
Oklahoma	19,250		
Texas	106,680		

Estimated numbers may not add to total because of rounding.

SOURCE: Projections by Division of Nursing, BHPr, HRSA, USDHHS, 1989.

Table VIII-A-7. Projected Requirements for Full-Time Equivalent Registered Nurses from Criteria-Based Model, by Geographic Area and Educational Preparation, 2000

Geographic area	Total	Lower Bound			
		Associate degree & diploma	Bacca-laureate	Master's	Doctorate
United States	2,102,000	691,540	1,018,700	363,790	27,970
New England	118,850	39,900	57,340	20,040	1,570
Connecticut	26,940	8,990	12,940	4,600	410
Maine	11,360	3,850	5,520	1,840	150
Massachusetts	58,430	19,800	28,180	9,750	700
New Hampshire	7,730	2,400	3,750	1,470	110
Rhode Island	8,900	3,060	4,300	1,390	150
Vermont	5,490	1,800	2,650	990	50
Middle Atlantic	137,000	45,560	66,670	22,800	3,040
New Jersey	66,180	22,320	31,990	11,060	810
New York	160,820	55,530	77,800	25,200	2,290
Pennsylvania	118,130	40,380	57,220	18,400	2,130
South Atlantic	354,270	116,550	171,600	62,430	4,690
Delaware	4,800	1,580	2,320	770	130
District of Columbia	10,730	3,890	5,180	1,520	140
Florida	110,260	35,890	53,320	20,860	1,190
Georgia	51,290	16,840	24,950	9,040	460
Maryland	37,880	12,440	18,220	6,760	460
North Carolina	50,820	16,790	24,610	8,760	660
South Carolina	24,760	8,060	12,070	4,220	410
Virginia	44,930	14,660	21,730	7,540	1,000
West Virginia	18,800	6,400	9,200	2,960	240
East South Central	137,000	45,560	66,670	22,800	3,040
Alabama	36,020	12,000	17,500	5,850	650
Kentucky	32,070	10,450	15,600	5,430	590
Mississippi	22,190	7,380	10,840	3,850	1,210
Tennessee	46,720	15,730	22,730	7,670	590
West South Central	213,800	68,070	104,320	38,570	2,840
Arkansas	20,480	6,770	9,930	3,540	240
Louisiana	35,510	11,440	17,360	6,130	580
Oklahoma	26,120	8,330	12,660	4,790	340
Texas	131,690	41,530	64,370	24,110	1,680
East North Central	379,440	126,890	184,160	62,840	5,540
Illinois	108,530	36,500	52,570	18,200	1,260
Indiana	46,540	15,330	22,630	7,530	1,050
Michigan	78,050	25,890	38,000	13,200	950
Ohio	100,070	33,710	48,590	16,280	1,490
Wisconsin	46,250	15,460	22,370	7,630	790
West North Central	174,840	58,980	84,530	28,350	2,940
Iowa	26,820	9,040	13,000	4,400	340
Kansas	22,300	7,350	10,780	3,700	470
Minnesota	43,650	14,710	21,000	7,610	330
Missouri	51,760	17,590	25,090	8,500	580
Nebraska	16,140	5,460	7,800	1,910	970
North Dakota	6,840	2,330	3,310	1,070	130
South Dakota	7,330	2,500	3,550	1,160	120
Mountain	102,230	31,210	49,880	19,890	1,240
Arizona	27,980	8,650	13,640	5,400	280
Colorado	26,650	8,360	12,980	5,050	260
Idaho	7,330	2,190	3,600	1,470	70
Montana	8,040	2,680	3,900	1,360	100
Nevada	6,750	1,950	3,290	1,410	100
New Mexico	10,340	3,110	4,990	2,110	130
Utah	10,920	3,000	5,400	2,280	240
Wyoming	4,220	1,270	2,080	810	60
Pacific	276,460	86,100	133,440	54,000	2,920
Alaska	3,020	890	1,490	590	50
California	206,070	64,200	99,340	40,430	2,100
Hawaii	8,970	2,830	4,340	1,720	80
Oregon	22,860	7,060	11,070	4,410	320
Washington	35,540	11,120	17,200	6,850	370

Estimated numbers may not add to total because of rounding.

Table VIII-A-8. Projected Requirements for Full-Time Equivalent Registered Nurses from Criteria-Based Model, by Geographic Area and Educational Preparation, 2000 (continued)

Geographic area	Total	Upper Bound			
		Associate degree & diploma	Bacca-laureate	Master's	Doctorate
United States	2,657,800	703,760	1,326,320	586,170	41,550
New England	151,010	40,950	74,610	33,080	2,370
Connecticut	34,450	9,380	16,850	7,610	610
Maine	14,310	3,880	7,140	3,080	210
Massachusetts	74,190	20,200	36,770	16,160	1,060
New Hampshire	9,820	2,510	4,810	2,310	190
Rhode Island	11,330	3,160	5,580	2,370	220
Vermont	6,910	1,820	3,460	1,550	80
Middle Atlantic	438,820	118,310	220,260	92,930	7,320
New Jersey	84,130	22,550	42,000	18,380	1,200
New York	205,000	55,200	103,280	43,320	3,200
Pennsylvania	149,690	40,560	74,980	31,230	2,920
South Atlantic	448,520	119,080	222,970	100,930	7,230
Delaware	6,160	1,650	3,000	1,020	180
District of Columbia	13,710	3,790	6,960	2,770	190
Florida	138,740	37,130	68,710	30,950	1,950
Georgia	64,860	17,040	32,430	14,630	760
Maryland	48,620	12,890	23,890	11,110	730
North Carolina	64,230	17,160	31,930	14,140	1,000
South Carolina	31,300	8,210	15,600	6,870	620
Virginia	57,210	15,000	28,360	12,380	1,470
West Virginia	23,690	6,210	12,090	5,060	330
East South Central	172,110	45,450	86,970	36,650	3,040
Alabama	45,240	12,060	22,820	9,420	940
Kentucky	40,260	10,520	20,280	8,630	830
Mississippi	27,640	7,270	14,080	5,910	380
Tennessee	58,970	15,600	29,790	12,690	890
West South Central	267,650	69,300	134,290	59,670	4,390
Arkansas	25,600	6,920	12,800	5,500	380
Louisiana	44,560	11,490	22,430	9,780	860
Oklahoma	32,690	8,630	16,260	7,250	550
Texas	164,800	42,260	82,800	37,140	2,600
East North Central	478,220	127,850	240,180	102,080	8,110
Illinois	137,080	36,670	68,950	29,550	1,910
Indiana	58,410	15,560	29,250	12,160	1,440
Michigan	98,380	26,060	49,390	21,490	1,440
Ohio	126,320	33,770	63,560	26,810	2,180
Wisconsin	58,030	15,790	29,030	12,070	1,140
West North Central	219,080	59,720	109,990	46,150	3,210
Iowa	33,380	9,220	16,750	6,910	500
Kansas	28,000	7,550	13,940	5,830	680
Minnesota	55,010	15,000	27,450	12,010	540
Missouri	64,980	17,580	32,800	13,740	860
Nebraska	20,120	5,530	10,130	4,190	270
North Dakota	8,590	2,320	4,300	1,720	200
South Dakota	9,000	2,470	4,620	1,750	160
Mountain	129,140	32,320	64,030	30,590	2,000
Arizona	35,270	9,020	17,460	8,320	470
Colorado	33,710	8,580	16,780	7,930	420
Idaho	9,120	2,250	4,580	2,180	110
Montana	10,040	2,640	5,100	2,160	140
Nevada	8,680	2,080	4,190	2,240	170
New Mexico	13,320	3,320	6,430	3,250	220
Utah	13,800	3,180	6,830	3,320	370
Wyoming	5,200	1,250	2,660	1,190	100
Pacific	353,310	90,420	173,010	85,270	4,610
Alaska	3,750	900	1,890	890	70
California	264,280	67,490	129,110	64,320	3,360
Hawaii	11,420	2,970	5,620	2,700	130
Oregon	28,960	7,390	14,250	6,840	480
Washington	44,900	11,670	22,140	10,520	570

Estimated numbers may not add to total because of rounding.

Source: Projections by Division of Nursing, BHPr, HRSA, USDHHS, 1989.

Table VIII-A-9. Projected Requirements for Full-Time Equivalent Licensed Practical/Vocational Nurses and Nursing Aides, from Criteria-Based Model, 2000

Geographic area	LPN/VNs		Aides	
	Lower bound	Upper bound	Lower bound	Upper bound
United States	345,500	343,000	1,395,700	1,685,200
New England	21,110	21,190	86,840	101,640
Connecticut	5,030	5,110	20,600	24,140
Maine	2,120	2,130	8,190	9,560
Massachusetts	10,040	10,000	41,950	48,820
New Hampshire	1,300	1,310	5,730	6,980
Rhode Island	1,710	1,750	6,710	7,740
Vermont	910	890	3,660	4,400
Middle Atlantic	52,770	51,090	209,130	250,330
New Jersey	9,840	9,590	41,270	49,620
New York	24,290	23,260	91,660	110,710
Pennsylvania	18,640	18,240	76,200	90,000
South Atlantic	58,310	58,210	237,530	286,350
Delaware	790	800	3,320	3,970
District of Columbia	1,000	860	4,410	5,210
Florida	22,000	22,470	84,480	100,780
Georgia	7,970	7,870	32,860	40,030
Maryland	5,420	5,350	24,200	29,220
North Carolina	8,630	8,660	35,090	41,990
South Carolina	3,750	3,740	15,960	19,440
Virginia	6,490	6,370	28,100	34,360
West Virginia	2,260	2,090	9,110	11,350
East South Central	20,860	20,340	83,740	102,160
Alabama	5,610	5,520	22,470	27,160
Kentucky	5,160	5,080	20,510	25,160
Mississippi	3,440	3,340	14,050	17,140
Tennessee	6,650	6,400	26,710	32,700
West South Central	35,450	35,410	146,190	179,360
Arkansas	4,270	4,360	15,730	18,660
Louisiana	5,290	5,180	22,950	28,310
Oklahoma	5,100	5,200	19,910	23,910
Texas	20,790	20,670	87,600	108,480
East North Central	685,190	620,410	556,340	303,050
Illinois	17,740	17,380	69,080	83,000
Indiana	8,330	8,350	33,410	39,870
Michigan	13,100	12,930	51,930	62,350
Ohio	16,300	16,000	63,490	76,240
Wisconsin	9,310	9,410	35,380	41,590
West North Central	33,820	33,970	125,540	147,370
Iowa	6,030	6,160	21,920	25,390
Kansas	4,350	4,410	16,490	19,370
Minnesota	8,310	8,340	31,620	37,170
Missouri	8,930	8,810	33,570	39,870
Nebraska	3,340	3,370	11,900	13,860
North Dakota	1,290	1,310	4,660	5,440
South Dakota	1,570	1,570	5,380	6,270
Mountain	14,670	14,610	66,130	83,440
Arizona	4,540	4,610	19,380	24,110
Colorado	3,710	3,650	16,330	20,420
Idaho	1,200	1,200	5,240	6,600
Montana	1,240	1,200	4,640	5,600
Nevada	720	720	3,990	5,240
New Mexico	1,480	1,490	6,940	8,640
Utah	1,350	1,340	7,210	9,690
Wyoming	430	400	2,400	3,140
Pacific	43,880	44,190	186,460	230,440
Alaska	320	300	1,680	2,210
California	31,450	31,560	135,510	167,930
Hawaii	1,440	1,460	5,840	7,100
Oregon	3,880	3,930	16,230	20,070
Washington	6,790	6,940	27,200	33,130

Estimated numbers may not add to total because of rounding.

SOURCE: Projections by Division of Nursing, BHPr, HRSA, USDHHS, 1989.

END

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